AUTOMOTIVE and Aviation INDUSTRIES

JUNE 1, 1946

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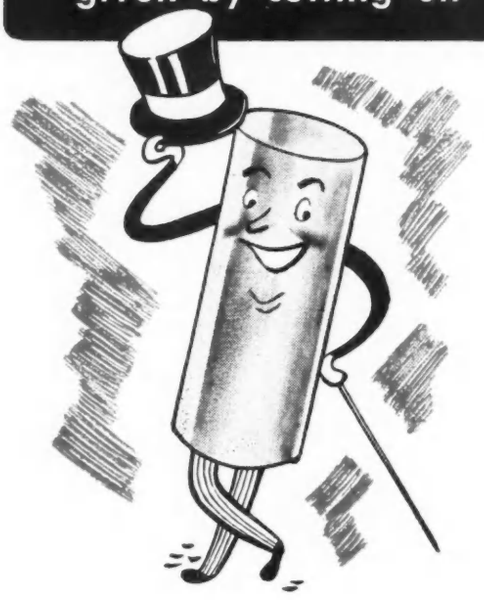

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AUTOMOTIVE and Aviation INDUSTRIES

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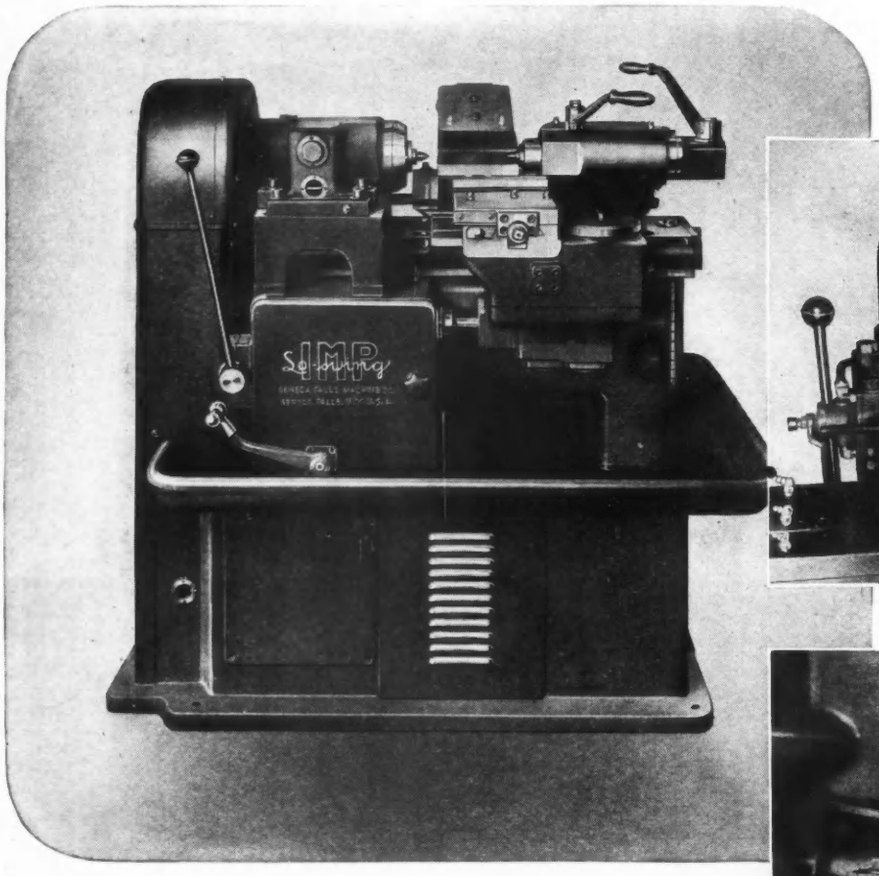
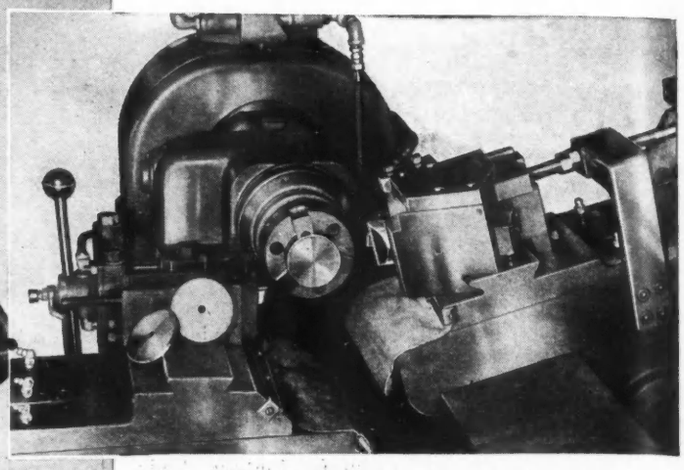
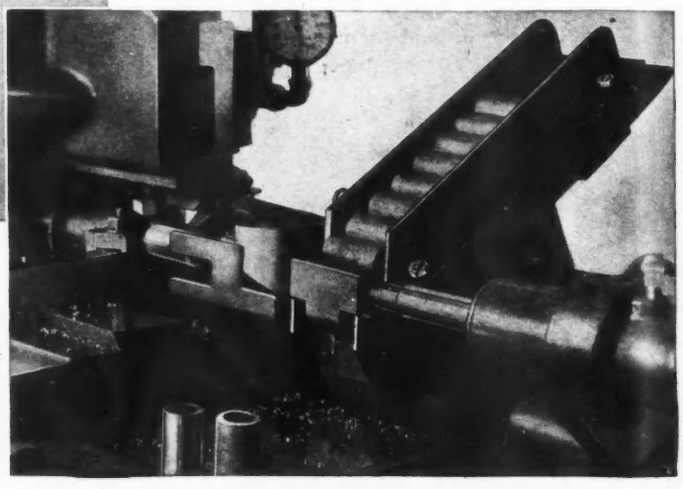
PREPARED BY THE SENECA FALLS MACHINE CO. **"THE Lo-swing PEOPLE"** SENECA FALLS, NEW YORK

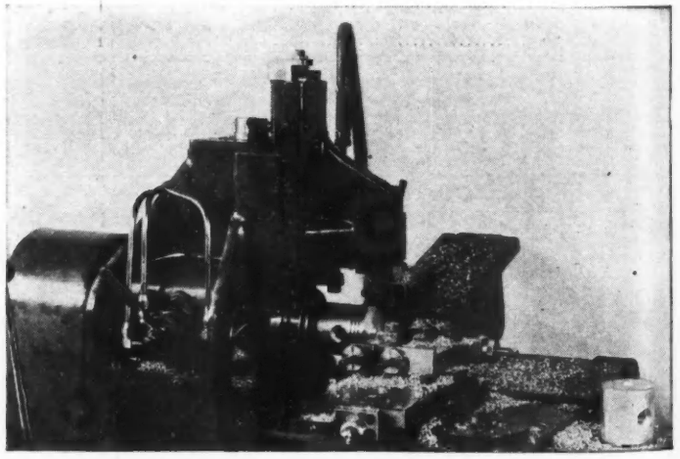




IMP with Back-Squaring Attachment



IMP with Automatic Loader



IMP with Back-Squaring Attachment and Third Slide

Lo-swing IMP

A VERSATILE AUTOMATIC LATHE FOR SMALL WORK DEMANDING HIGH SPEEDS AND EXTREME ACCURACY

● **The Lo-swing IMP Lathe lends itself to practically unlimited tooling possibilities. Illustration above shows a standard machine. The close-up views show three typical applications of standard and special attachments to the base machine which have resulted in increased production and lowered costs.**

If you have a turning job requiring high speeds, fine finishes and extreme accuracy, write for IMP Bulletin N-42.

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Seneca Falls, N. Y.

LATHE NEWS from SENECA FALLS

AUTOMOTIVE and AVIATION INDUSTRIES

Published on the first and 15th of the month

June 1, 1946
Volume 94, No. 11

An Important Study —

Deflation or Inflation?

Reviewed by Julian Chase

INVESTIGATING, analyzing and weighing recent and current factors toward both deflation and inflation, Dr. Jules Backman, Professor of Economics at the School of Commerce of New York University, and M. R. Gainsbrugh, Chief Economist of the Conference Board staff, have completed a comprehensive and penetrating study for the National Industrial Conference Board.

While concluding that inflationary tendencies have reached a critical stage, the authors express the opinion that runaway inflation can still be prevented, but only if there is adopted "an integrated, balanced program" to hold in check "all inflationary forces." Their suggested program of action comprises the avoidance of further expansion of excessive consumer purchasing, the halting of all deficit financing, the maximum possible reduction of governmental spending for public works, the limitation of inventory speculation, encouragement of greater productivity to lower unit costs, restrictions on the further easing of credit.

The administration in Washington, say the authors, is waging war against both deflation and inflation as a result, probably, of opposing views in "high places" as to whether the conversion period would be characterized by one or the other. The effect of the wage-policy set up by Executive Order 9697, by taking wage increases out of profits, is, they point out, to increase "the funds which press most directly upon our present limited supply of consumer goods" while decreasing the possibility of amplifying the means of production. Some price increases must necessarily follow such wage increases and OPA, neither as it is nor as it may be, can, alone, maintain an effective check on the rising cost-price spiral. But, they add, it is artless to believe "that all price increases *per se* are inflationary."

Dr. Backman and Mr. Gainsbrugh are sufficiently generous to credit the labor union leaders with only deflationary fears as their motives for demanding higher wages, to the tune of 30 per cent or else, and for starting their agitations along that line even before war production ended. Such alleged fears were vociferously and persistently expressed in what the authors call "near-hysterical terms." However, the specific fears advanced are now proved to have been unfounded. Both the unions' and the government's predictions regarding the extent of reconversion unemployment have turned out to be as much, in some cases, as 8,000,000 too high. Furthermore, wage and salary totals, from V-J Day to the end of 1945, dropped only 11.5 per cent instead of the 30 per cent predicted. The decline, the authors point out, was from a relatively high level of income and the total wage and salary income remained higher than the value of goods available. Instead of causing deflationary conditions, therefore, the decline actually would have tended to reduce inflationary pressure.

One of the major inflationary pressures, according to the study, is increased unit labor costs. During the war these higher costs were absorbed through

(*Turn to page* 64, *please*)

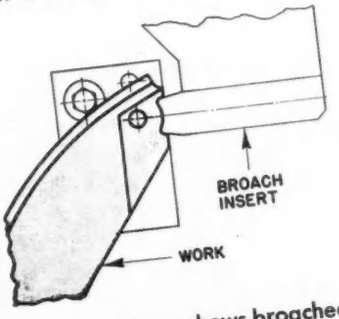
PART NAME: Brake Shoe

OPERATION: Broach Tapered Notch

PRODUCTION: 600 per Hour

MACHINE: CINCINNATI No. 130 Duplex Vertical Hydro Broach

CINCINNATI No. 1-30 Duplex Vertical Hydro-Broaching Machine tooled up to broach tapered notch in brake shoe for automobile wheel.



Drawing above shows broached surface. Left: CINCINNATI Duplex Vertical Hydro-Broach. Complete specifications may be obtained by writing for Catalog.

● The high production rate of 600 parts per hour on this job is indicative of the speed and ease with which the fixtures can be unloaded and loaded. The setup was developed by Cincinnati Application Engineers for broaching a tapered notch, $^{17}/_{32}$" wide, in automobile brake shoes. Special equipment consists of two automatic clamping fixtures, with completely guarded actuating elements to safeguard the operator. These fixtures clamp and release mechanically with indexing of table motion. The operator simply removes and replaces the work. This setup may give you an idea for stepping up production on some of your operations. Our engineers will be glad to talk applications with you. ¶ Complete details on CINCINNATI Broaching Machines will be sent on request. For a brief description of these machines, look in Sweet's Catalog File for Mechanical Industries.

CINCINNATI

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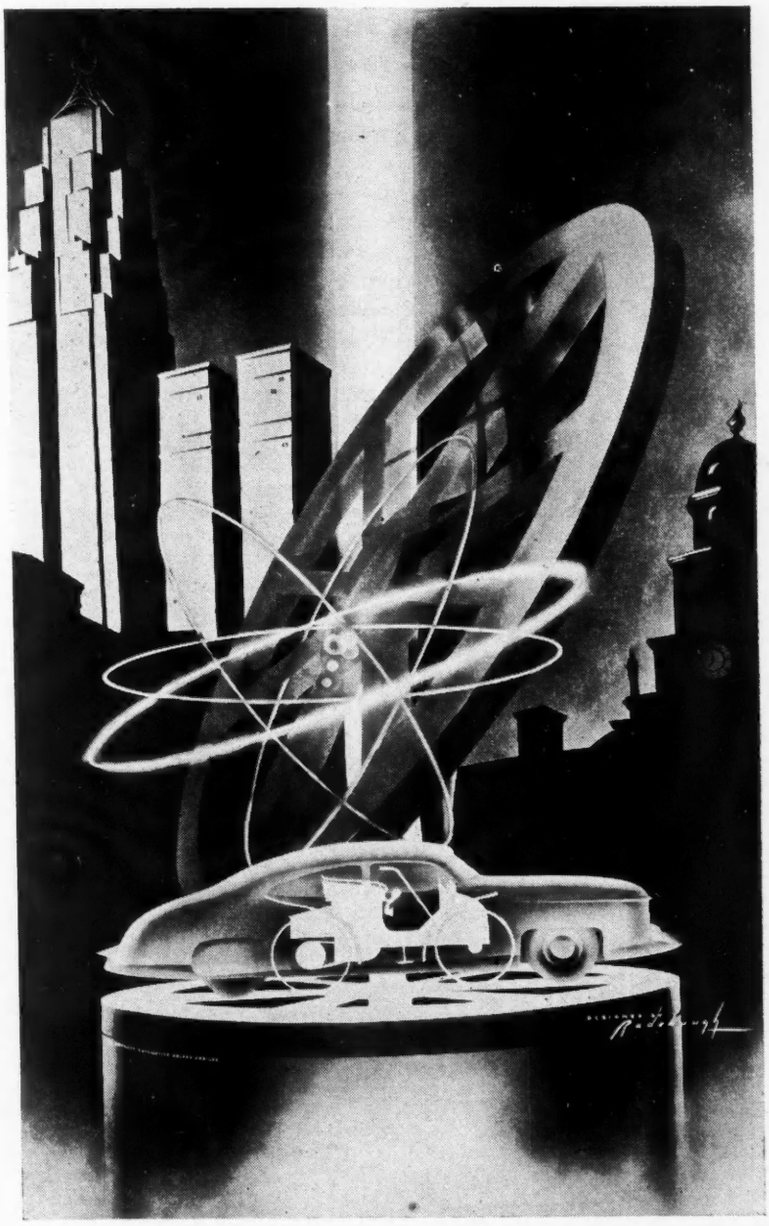
The Industry's Golden Jubilee

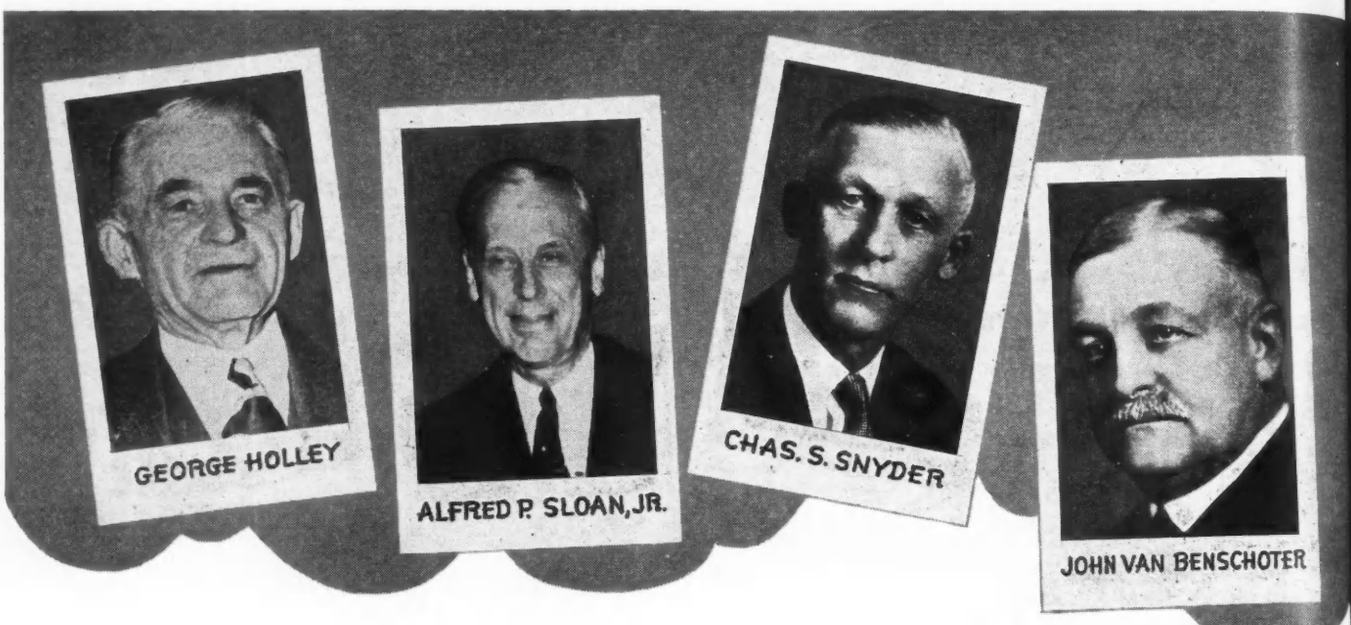
By Leonard Westrate

IN THE midst of strikes, production troubles, and in general the most turbulent days in its history, the automotive industry has just celebrated its 50th anniversary. The principal commemoration naturally was centered in Detroit, where most automobile assembly is concentrated, with colorful and extensive pageantry. The event also was observed in other sections of the country, where tributary industries which feed the automotive assembly plants are located.

The success of the celebration is more noteworthy considering the inauspicious times and the general pessimism pervading the industry. To many observers, the anniversary coming at this time had a double significance. They pointed out that it sharply defines the passing of an era which was marked by the free and rugged interplay of individual and economic forces. They also observed that the freedom of action which characterized the industry for so long and brought it to the forefront of American and even world industry, has been on the wane for the past decade, and that the rise of a new order of doing business under increasing government regulation and labor domination is clearly discernible. There was no suggestion, however, that the industry would not be able to "roll with the punch" and survive the era ahead, but there was a definite conviction that, for better or worse, the *modus operandi* of former years is gone.

The scope of the celebration held in Detroit was much too great to permit anything but a general chronicle of events of particular interest to the industry as a whole. One of the most important of these events was the





Birthdays of Current Passenger Cars

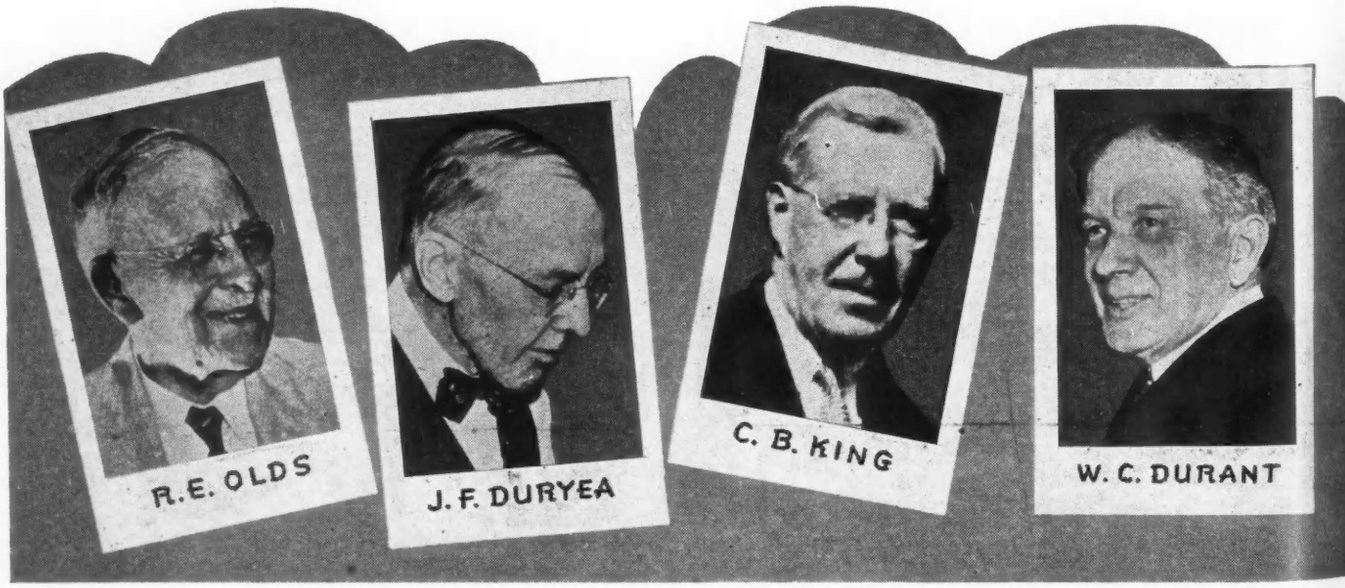
More Than Five Years Old

Buick	1903 (1)	Lincoln	1921
Cadillac	1902	Mercury	1939
Chevrolet	1912	Nash	1916 (3)
Chrysler	1924	Oldsmobile	1897
Crosley	1939	Packard	1899
DeSoto	1928	Plymouth	1928 (4)
Dodge	1914	Pontiac	1926 (5)
Ford	1896 (2)	Studebaker	1902 (6)
Hudson	1909	Willys-Overland	1903

(1) Succeeded Det. Auto. Co., organized 1896. (2) Present Ford Co. organized 1903. (3) Succeeded Rambler, born 1902. (4) Succeeded Maxwell, born 1904. (5) Original Pontiac product of Pontiac Body Co. 1885-1907 which was reorganized as Oakland M.C. Co., 1907; Oakland car discontinued 1931 following introduction of present Pontiac 1926. (6) Predecessors date back to wagon builders of 1835; experimented with "horseless carriages" in 1897 and regularly marketed first motor vehicle (electric) 1902.

tribute to ten individuals for their contributions in founding and pioneering the automotive industry. In addition to the ten men selected for the automotive "Hall of Fame," two pioneer automobile dealers and two workmen with more than 50 years of service in the industry were honored in a manner described later.

The pioneers were entertained at a dinner May 31 and at the presentation of a dramatic tribute which followed. The dramatization of epic developments in the automotive industry from its earliest inception to modern days included a series of short skits depicting such phases as invention of the four-cycle engine, discovery of the vulcanization principle in rubber, precision manufacture of automobile parts which resulted in interchangeability, inauguration of parts and service policies, development of the enclosed body, invention of the self-starter, and similar milestones.



Following the dramatic tribute, Lt. Gen. William S. Knudsen, general chairman of the jubilee committee, acknowledged on behalf of the entire industry the contributions of the pioneers in bringing the automobile business to a dominant state in the national economy. Charles W. Nash, chairman of the board of Nash-Kelvinator Corp., accepted the tribute for the pioneers. As youngest company president in the industry and representative of the younger element, Henry Ford II figuratively accepted the torch from Mr. Nash and pledged that the industry would carry on. The pioneers honored were:

Edgar Apperson, Phoenix, Ariz., pioneer builder and designer, who was responsible for many early mechanical advances;

William C. Durant, New York City, founder of General Motors, Chevrolet, and Durant;

J. Frank Duryea, Madison, Conn., who with his brother Charles, was among the first builders of gasoline powered vehicles in this country;

Henry Ford, Dearborn, known the world around for his famous assembly-line method of mass manufacturing and who drove his

(*Turn to page* 82, *please*)

Engineering Features of

By Robert T. Jackson
The Perfect Circle Co.

THE 1946 Indianapolis race, first major motor racing marathon of the American postwar scene, summoned a total of 56 entries, including a team entry of three cars made by a racing organization of Milan, Italy. Contrary to previous years, the lists were about evenly divided between fours, sixes, eights, with the usual representation of twelves and sixteens —one each.

Also entered was a Carracciola Special powered by a 91.5 cu in. Mercedes-Benz engine. Much interest was centered in this entry and it is indeed regrettable that it was scratched due to shipping difficulties. By all accounts it would have been a most formidable competitor as well as a subject of intense interest to American designers and engineers. In a recent issue of *Autocar* (London) the following item regarding this car appeared under the nom de plume—Vizor:

"Great efforts are being made by Carracciola to ship his 1½-liter Mercedes-Benz to America for the Indianapolis 500 on May 30. Only three of these cars are believed to have been built, and Mrs. Carracciola told me that two were presented to Carracciola by the Mercedes firm. When war broke out, however, Carracciola remained in Switzerland, where he had been living since 1933, and as he was placed on the Nazi black list he was unable to obtain delivery of the cars. They were eventually smuggled across the frontier to him by friends in Germany during the war, but the third has been seized by the Russians."

In addition to the Italian team entry mentioned above the entry list also embraced 10 Italian-built cars now in American hands, including the Boyle Maserati which won in 1939 and 1940.

Defense of American honors rested with a very capable group of cars and drivers, although most of the cars themselves were very little changed from their prewar specifications. A notable degree of postwar reconversion was achieved, however, in several instances.

These exceptions, each of which is worthy of individual attention, were easily the highlights of the American racing car design picture, at least in so far as the Indianapolis 500-mile race is concerned. Without doubt, the most interesting example of postwar design on hand was the Fageol Twin Coach Special. This novel car, which was designed by L. J. Fageol, president of the Twin Coach organization, shows the results of careful, well-directed design effort aimed at some very pertinent objectives.

Two views of this car appear in this article. According to a release from the Twin Coach advertising authorities, three important design objectives were attained by Mr. Fageol and his group in the development of this car. These aims were: effective weight distribution, unshifting center of gravity, and constant tractive effort.

One of the photos illustrates the installation of an engine at each end of the car. Each drives, but independent of the other. There is no power connection between these

Don Lee Special with 300 hp Alfa-Romeo engine. It burns alcohol. (Acme photo)

Indianapolis Race Cars

engines. They are linked only by a common throttle control which is set to give identical engine speeds. This particular form of design disposes of two of Mr. Fageol's primary objectives—weight distribution and tractive effort. With an engine at each end of the car the weight concentrated on the wheels is practically the same at either front or rear. There being no power connection between front and rear engines, either can drive its pair of wheels unaffected by any conditions of slip or skid which might be influencing the opposite pair of wheels.

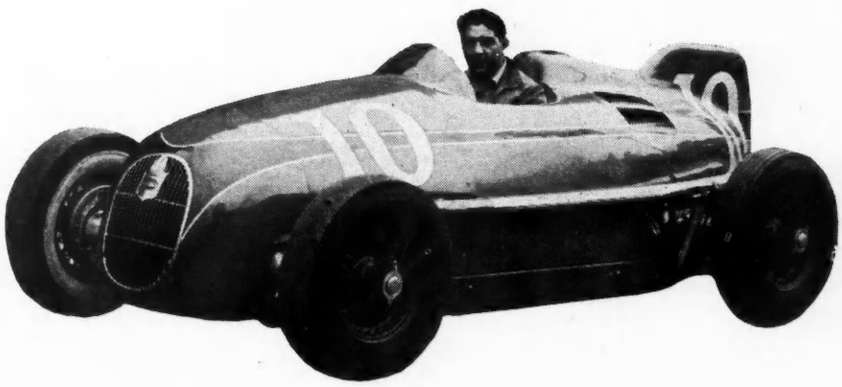
The third objective—that of unshifting center of gravity—is met by locating the bulk of the fuel supply in the center of the chassis. In this way the center of gravity remains unchanged as the load lightens due to consumption of fuel. No description of the Twin Coach Special can be complete without reference to the Torsilastic springing method employed. This novel design also is used on Twin Coach buses. In general, it consists of a cylinder of rubber bonded to an outer housing and an inner shaft. The suspension elements are secured to housing and shaft respectively.

Power plants of the Twin Coach car are 91 cu in. Offenhauser four-cylinder engines, each boosted by a

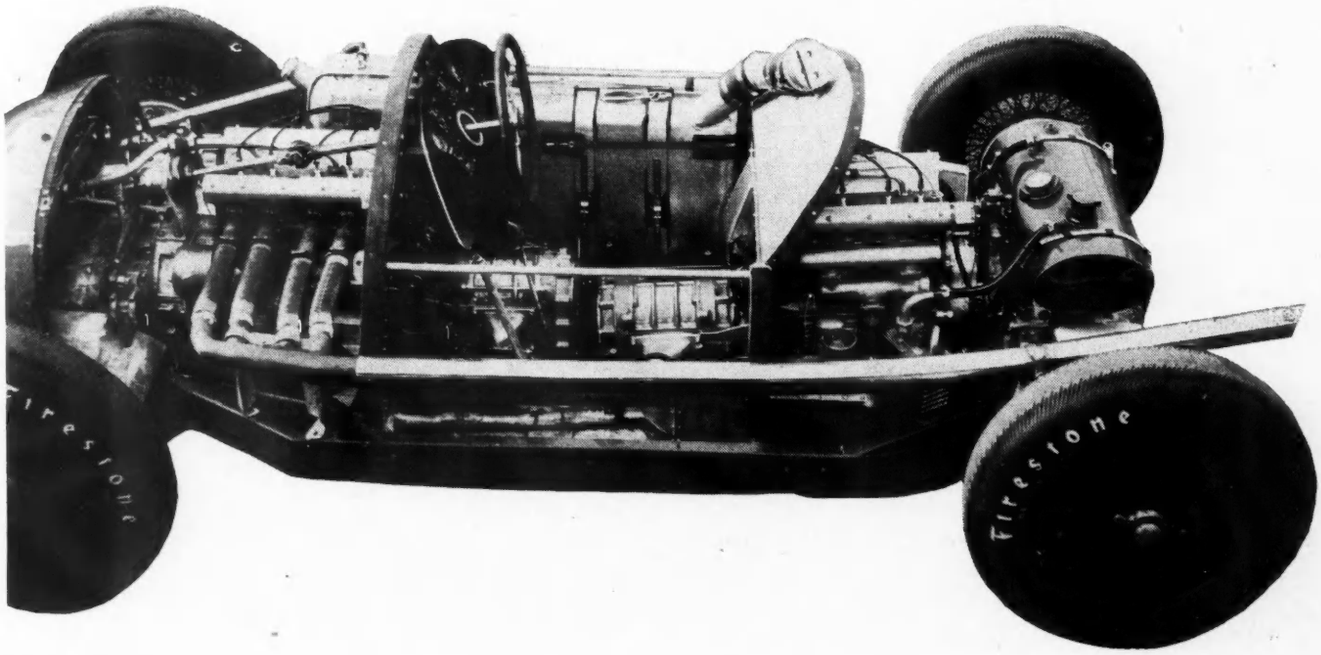
HOW THEY FINISHED

Place	Car No.	Driver	Avg. Speed
First	16	Geo. Robson	114.820 mph
Second	61	Jackson	114.498 mph
Third	29	Horn	109.820 mph

(Right) Fageol Twin Coach Special. Paul Russo is at the wheel.



(Below) View of Twin Coach Special chassis showing arrangement of the two four-cylinder engines and location of fuel tank and Rootes type blowers amidships. The two engines develop 320 hp.



sizable Rootes type blower using the helical rotor shape. These power units drive the car through axle mechanisms which are understood to be adapted from the driving units used on the front-drive Fords constructed for the 1935 race by Harry A. Miller. The present installation of these units naturally required their modification to fit the Twin Coach design.

The blowers are located at the midships end of each engine. This brings them quite close together in the center of the cockpit space, as shown by the view. Incidentally, since the driver's seat is mounted directly over these blowers, it was found advisable to set the rear engine at a slightly greater angle than the other so as to gain a correspondingly lower position for the seat.

Performance of this car in practice was almost surprisingly good. It appears to ride and handle extremely well. In short it bears out the design predictions of Mr. Fageol and his associates to a very satisfying degree.

Also of considerable interest was the Novi Governor Special front drive car produced by Winfield Engineering, Inc. This entry, which arrived at the track rather late, is an outstanding example of front drive design. The front end is independently sprung by torsion bars. Wheels are carried by a pair of parallel arms and spherical contour knuckle structures. The upper support arms are cast aluminum alloy. Lower arms are fabricated from chrome-moly steel sheet. The general arrangement of this front end

Indianapolis Entrants

Car No.	NAME	DRIVER	Engine Make	No. Cylinders	Bore	Stroke	Displacement	Supercharger	Ignition: Spark Plug	Ignition: Make	Ignition: Cable	Carburetors: Make	Carburetors: No.	Carburetors: Style	Piston Rings	Suspension: Front	Suspension: Rear	Shock Absorbers: Front	Shock Absorbers: Rear	Brakes	Starter	Drive	Fuel: Make	Fuel: Gallons	Oil: Make	Oil: Quarts	Weight	Wheelbase	Qualifying Speed
1	Bowes Seal Fast Spl.	Rex Mays	B	8	2.96	3.25	179	C	B	B	P	W	2	DD	PC	C	C	H	H	H	H	R	A	52	RF	40	2084	104	129.931
2	Novi Governor Spl.	Ralph Hepburn	W	8	3.125	2.937	180	C	B	B	P	W	3	DD	PC	I	C	H	H	H	H	F	A	80	M	48	....	106	133.944
3	Noc-Out Hose Clamp Spl.	Cliff Bergere	O	4	4.31	4.62	270	N	C	B	P	W	2	UD	B	C	C	FH	FH	H	B	R	S	58	O	40	1976	100.5	128.471
5	Miller Spl.	Chet Miller	O	4	4.25	4.5	255	N	C	B	P	W	2	UD	PC	C	C	H	H	M	E	F	....	55	O	32	1910	100	121.949
7	Wolf Motor Co., Tulsa Spl.	Frank Wearne	O	4	4.31	4.5	262	N	C	B	P	W	2	UD	PC	C	C	H	H	H	B	R	S	58	RF	32	1820	....	....
8	Blue Crown Spark Plug Spl.	Mauri Rose	O	4	4.29	4.5	265	N	BC	B	P	W	2	UD	B	C	C	H	H	M	E	R	L	43	T	44	1830	103	121.085
9	Blue Crown Spark Plug Spl.	....	L	6	3.75	4	265	N	BC	B	P	W	4	H	B	C	C	H	H	D	E	R	L	43	T	44	1960	102	....
10	Fageol Twin Coach Spl.	Paul Russo	O	4*	2.93	3.37	91*	R*	C	W	P	W	2*	UD	PC	1*	1*	H	H	H	E	4W	A	55	RF	33	....	102	123.183
12	Kuehn Spl.	Al Putnam	O	4	4.25	4.5	255	N	C	B	P	W	2	UD	PC	C	C	H	H	H	E	R	G	31	....	34	1854	....	119.233
14	Mobiloil Spl.	Harry McQuinn	S	6	3.20	3.75	181	C	C	B	P	W	1	H	PC	C	C	FH	FH	H	H	R	A	60	M	40	1980	105	121.499
16	Thorne Engrg. Co. Spl.	Geo. Robson	S	6	3.2	3.75	182	C	C	B	P	W	1	H	PC	C	C	FH	FH	H	H	R	A	60	O	32	1980	105	125.541
17	Schoof Spl.	Frank McGurk	O	4	4.25	4.5	255	N	C	B	P	W	2	UD	PC	C	C	H	H	H	E	R	G	35	....	40	1830	100	....
18	Elgin Piston Pin Spl. (8CTF)	Emil Andres	MA	8	2.68	4	179	2R	C	S	P	ME	2	H	B	I	C	MA	FH	H	H	R	A	48	O	44	2000	107	121.139
24	Noc-Out Hose Clamp Spl.	Joe Chitwood	O	4	4.31	4.62	272	N	C	B	P	W	2	UD	B	C	C	FH	H	H	B	R	S	31	O	40	1982	102	119.816
25	Jim Hussey Spl. (8CTF)	Russ Snowberger	MA	8	2.68	4	179	2R	C	S	P	ME	2	H	PC	I	C	MA	H	H	H	R	A	52	O	44	2015	107	121.593
26	....	Geo. Barringer	M	6	3.5	3.12	180	C	C	B	P	P	2	DD	PC	I	I	FH	FH	H	E	4W	GU	40	G	36	2225	102	....
27	Marchese Spl.	Tony Bettenhausen	M	8	2.5	3.5	137	C	C	B	P	M	2	DD	PC	C	C	FH	FH	H	E	R	G	35	C	36	1769	100	121.860
28	....	Steve Truchan	....	4	4.33	4.62	272	N	C	B	P	W	2	DD	PC	C	C	H	H	M	E	R	G	27	RF	30	1955	100	....
29	Boyle Maserati Spl. (8CTF)	Ted Horn	MA	8	2.68	4	179	2R	C	S	P	ME	2	H	PC	I	C	MA	H	H	H	R	A	52	O	32	1978	107	123.980
31	Automobile Shippers Spl.	Harry Banks	M	4	4.25	4.5	255	N	C	B	P	W	3	X	PC	C	C	H	H	M	E	F	G	28	RF	36	1943	100.5	120.220
32	Spike Jones Spl.	Sam Hanks	S	16	2.18	3	183	2C	C	B	P	W	2	DD	AH	C	D	H	H	H	H	R	A	50	O	40	2168	105.5	121.762
33	Alfa-Romeo Spl.	Louis Durant	AR	8	2.7	3.93	182	2R	C	B	P	WE	2	UD	PC	I	C	H	H	H	H	R	A	40	....	32	1902	108.5	119.973
34	Milt Marion Entry	Tommy Hinnershitz	MA	8	3.31	2.62	181	R	C	S	P	WE	1	UD	PC	I	I	F	F	H	H	R	A	49	....	40	1873	105	....
35	Alfa-Romeo	Raph	AR	8	....	....	....	2R	....	....	....	....	....	....	....	....	....	....	....	....	H	R	A	....	....	....	....	....	....	....
36	Maserati	H. O. Schell	MA	6	....	....	....	R	....	....	....	....	....	....	....	....	....	....	....	....	H	R	A	....	....	....	....	....	....	....
37	Greenfield Sales & Serv.-Spl.	Barbowski	ST	8	3.18	4.25	270	N	C	B	P	W	4	DD	PC	C	C	H	H	H	E	R	G	37	RF	16	....	104	....	....
38	....	Henry Banks	O	4	4.31	4.62	270	N	C	B	P	W	2	UD	PC	C	C	H	H	H	E	R	A	57	RF	32	1853	100	....	....
39	Sheffler-Offenhauser Spl.	Bill Sheffler	O	4	4.25	4.5	255	N	C	B	P	W	2	UD	PC	C	C	FH	FH	H	E	R	G	25	....	24	....	100	128.011	....
41	Offenhauser Spl.	Mel Hansen	O	4	3.81	4	182	I	C	B	P	W	2	DD	B	C	C	H	H	H	B	R	A	70	RF	60	....	100	....	....
42	Bristow	Roland Free	M	8	2.82	3.5	182	C	C	B	P	S	I	....	....	C	C	H	H	H	H	F	....	....	....	....	1900	....	....	....
43	Mitchell Corp. Spl.	W. Mitchell	BR	8	3.62	4.37	271	N	C	B	P	W	3	UD	PC	C	C	H	H	M	E	R	A	38	O	32	....	101	....	....
44	Thorne Engrg. Co. Spl.	Joe Thorne	S	6	3.53	4.62	272	N	C	B	P	W	6	H	PC	C	C	FH	FH	H	H	R	A	50	O	40	1974	105	....	....
45	Johnston Spl.	Duke Dinsmore	O	4	4.25	4.5	255	N	C	B	P	W	2	DD	PC	C	C	H	H	M	E	R	G	35	G	24	1920	101	123.279	....
46	Maserati	Louis Gerard	MA	....	....	....	....	R	....	....	....	....	....	....	....	....	....	....	....	....	H	R	A	....	....	....	....	....	....	....
47	Don Lee Spl.	Hal Cole	AR	8	2.67	2.93	176	2R	C	S	P	WE	2	UD	PC	C	C	H	H	M	H	R	A	60	RF	36	....	105.5	123.728	....
48	Phillips-Miller Spl.	Hal Robson	M	8	3.5	3.5	269	N	C	B	P	M	4	.....	.....	C	C	F	F	H	E	R	G	28	C	48	....	100	121.456	....
49	Talbot	Z. Arkus-Duntov	....	6	....	....	274	N	....	....	....	....	....	....	....	....	....	....	....	....	....	R	....	....	....	....	....	....	....	....
51	Boxar Tool Spl.	L. Tomei	BR	6	3.62	4.37	271	N	C	B	P	W	3	UD	PC	C	C	H	H	M	E	F	A	50	O	42	1980	104	119.193	....
52	Maserati 8CL	....	MA	8	3.06	3.06	180	2R	....	S	....	....	2	H	M	I	C	MA	MA	H	H	R	A	....	....	....	....	....	....	....
53	Maserati 4CL	Achille Varzi	MA	4	3.06	3.06	90	2R	....	S	....	....	2	H	M	I	C	MA	MA	H	H	R	A	....	....	....	....	....	....	....
54	Maserati 4CL	Gigi Villoresi	MA	4	3.06	3.06	90	2R	....	S	....	....	2	H	M	I	C	MA	MA	H	H	R	A	....	....	....	....	....	....	....
55	Clemons Spl.	Langley	C	4	....	....	138	C	....	....	....	....	....	....	....	....	....	....	....	....	....	R	....	....	....	....	....	....	....	....
56	Greene-Holland Spl.	Bruce Denslow	....	6	....	....	259	N	....	....	....	....	....	....	....	....	....	....	....	....	....	R	....	....	....	....	....	....	....	....
57	Lagonda Spl.	Robt. M.W.Arbuthnot	LA	12	....	....	273	N	....	....	....	....	....	....	....	....	....	....	....	....	....	R	....	....	....	....	....	....	....	....
58	Bee-Gee Detroit	Harold Bailey	....	6	....	....	120	C	....	....	....	....	....	....	....	....	....	....	....	....	....	R	....	....	....	....	....	....	....	....
59	Grancor V8 Spl.	Danny Kladis	F	8	3.31	3.87	268	N	C	B	P	S	2	DD	AH	C	C	F	F	....	E	F	G	25	....	21	....	100	....	....
61	Jackson Spl.	Jimmy Jackson	O	4	4.27	4.5	258	N	C	B	P	W	2	DD	PC	C	C	H	H	M	E	F	G	37	O	28	1980	105	120.257	....
62	Singer Spl.	Chas. Van Auker	V	6	3.4	5	274	N	C	B	P	W	2	UD	B	C	C	F	F	H	E	R	A	34	RF	30	1890	100.5	....	....
63	Mobiloil Spl.	Jimmy Wilburn	AR	8	3.01	3.2	182	2R	C	B	P	WE	2	UD	PC	C	C	FH	FH	H	H	R	A	55	M	30	1974	102	125.113	....
64	Offenhauser	Shorty Cantlon	O	4	....	....	255	N	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	122.432
65	Offenhauser	....	O	4	....	....	270	N	....	....	....	....	....	....	....	....	....	....	....	....	....	R	....	....	....	....	....	....	....	....
67	Robson & Holland Entry	....	O	4	4.31	4.62	270	N	C	B	P	W	2	UD	PC	C	C	H	H	H	E	R	G	40	RF	32	.....	99.5	.....	....
68	Maserati Spl.	Jim Brubaker	MA	8	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	R	....	....	....	....	....	....	....	....
69	Purdy Offenhauser	Bud Rose	O	....	....	....	262	....	....	....	....	....	....	....	....	....	....	....	....	....	....	F	....	....	....	....	....	....	....	....
71	Jewel Spl.	....	....	4	....	....	255	....	....	....	....	....	....	....	....	....	....	....	....	....	....	R	....	....	....	....	....	....	....	....
W	Carracciola Spl.	Rudolf Carracciola	MB	8	....	....	91	R	....	....	....	....	....	....	....	....	....	....	....	....	....	R	....	....	....	....	....	....	....	....
W	Maserati	Lanza	....	....	....	....	....	R	....	....	....	....	....	....	....	....	....	....	....	....	....	R	....	....	....	....	....	....	....	....

ABBREVIATIONS

ENGINE MAKE
MA—Maserati
M—Miller
O—Offenhauser
S—Sparks
L—Lencki
B—Bowes S-F
AR—Alfa-Romeo
ST—Studebaker
BR—Brisko
V—Voelker
*—2 Engines per Car
SA—Sampson
C—Clemons
F—Ford
LA—Lagonda
MB—Mercedes-Benz
W—Winfield

PISTON RINGS
PC—Perfect Circle
B—Burd
M—Maserati
AH—American Hammered

DRIVE
F—Front
R—Rear
4W—4-Wheel

SUPERCHARGER
R—Rootes
C—Centrifugal
N—None
*—1 per Engine

SPARK PLUGS
C—Champion
B—Bowes
BC—Blue Crown

IGNITION
B—Bosch
S—Scintilla
W—Wico

IGNITION CABLE
P—Packard

CARBURETORS
ME—Memini
M—Miller
W—Winfield
S—Stromberg
WE—Weber
P—Pigget
*—1 per Engine

STYLE
H—Horizontal
UD—Updraft
DD—Downdraft
X—{2 Updraft / 1 Downdraft

SUSPENSION
I—Independent
C—Conventional
*—Rubber Springing
D—DeDion, Torsion Bar

BRAKES
H—Hydraulic
M—Mechanical
D—Disc

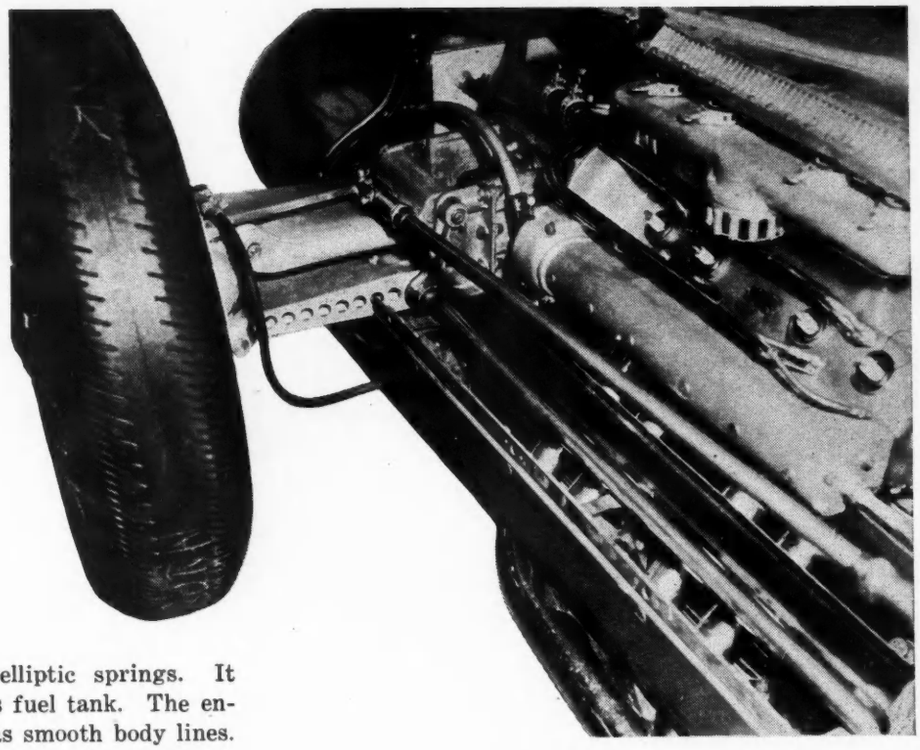
SHOCK ABSORBERS
H—Houdaille
F—Friction Types
HF—Hartford
MA—Maserati
G—Gabriel
FH—Friction and Hydraulic

STARTER
H—Handcrank
B—Bosch
E—Electric

CAR NO.
W—Entry Withdrawn

FUEL
A—Alcohol
S—Shell Blend
L—Lencki
GU—Gulf No-Nox
G—Gasoline

OIL
O—Oilsum
RF—McMillan Ring Free
T—Thompson Aerotype
M—Mobiloil
G—Gulfpride
C—Castor



Left front suspension of Novi Governor Special, the front wheels being independently sprung by torsion bars. The left steel torsion bar is visibile below the drag link.

structure can be seen in the accompanying photograph.

Steering gear in this car is also a nice feature, although there is nothing new in the principle. It is a dual setup, having a separate drag link to each front wheel. (Maserati has used this for some years.) This type of construction eliminates any type of track rod or short link between wheels. Rear suspension of this car is conventionally handled by semi-elliptic springs. It carries an exceptionally capacious fuel tank. The entire car is remarkably low and has smooth body lines. Engine of the Novi Governor Special is the same type of blown V-8 which was used by Ralph Hepburn in the Bowes Seal-Fast Special he drove in 1941.

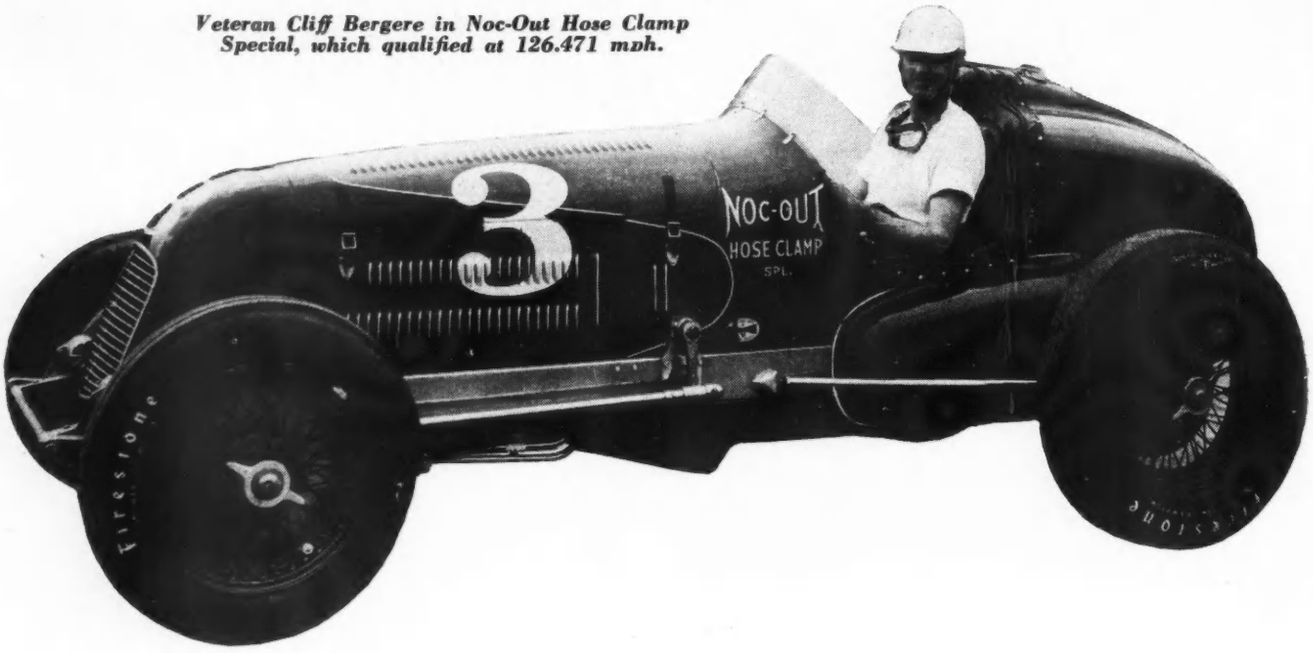
A fine study in classic body lines was the Offenhauser Special driven by Mel Hansen. This car, which employs an older engine formerly used by Leon Duray, has a brand new chassis. Although entirely conventional in most respects, this chassis merits some consideration for its detailed construction. The frame structure is round chrome-moly tube about 3 in. or so in diameter. All fittings, shock absorber brackets, and similar attachments are welded to this structure. Body formers and framing are also welded to the basic tube on each side. This results in a complete unit of very compact proportions. The engine is supported on rubber mountings secured to shelf brackets welded on each frame tube.

Carracciola at the wheel of his new Mercedes-Benz just before the start of a test run near Zurich, Switzerland. Shipping difficulties prevented his getting it here in time for the Indianapolis races. (Acme photo)

Well rounded, flowing body lines are probably the outstanding feature of this car. It also is remarkably low, easily one of the lowest jobs, overall, which ever has shown at Indianapolis. Spring suspension is quite orthodox — transverse at each end of the car. Tank capacity is notably great, being approximately 70 gallons for fuel. Part of this supply is carried more or less amidships, at the driver's right side.

Although perhaps not too noteworthy from the standpoint of new design features, the balance of the American field supplies examples of detail refinements aimed at increased speed, better tire wear, and better all-around performance. Joe Lencki has been at work for some time on the development of a new fuel. He claims to have

Veteran Cliff Bergere in Noc-Out Hose Clamp Special, which qualified at 126.471 mph.



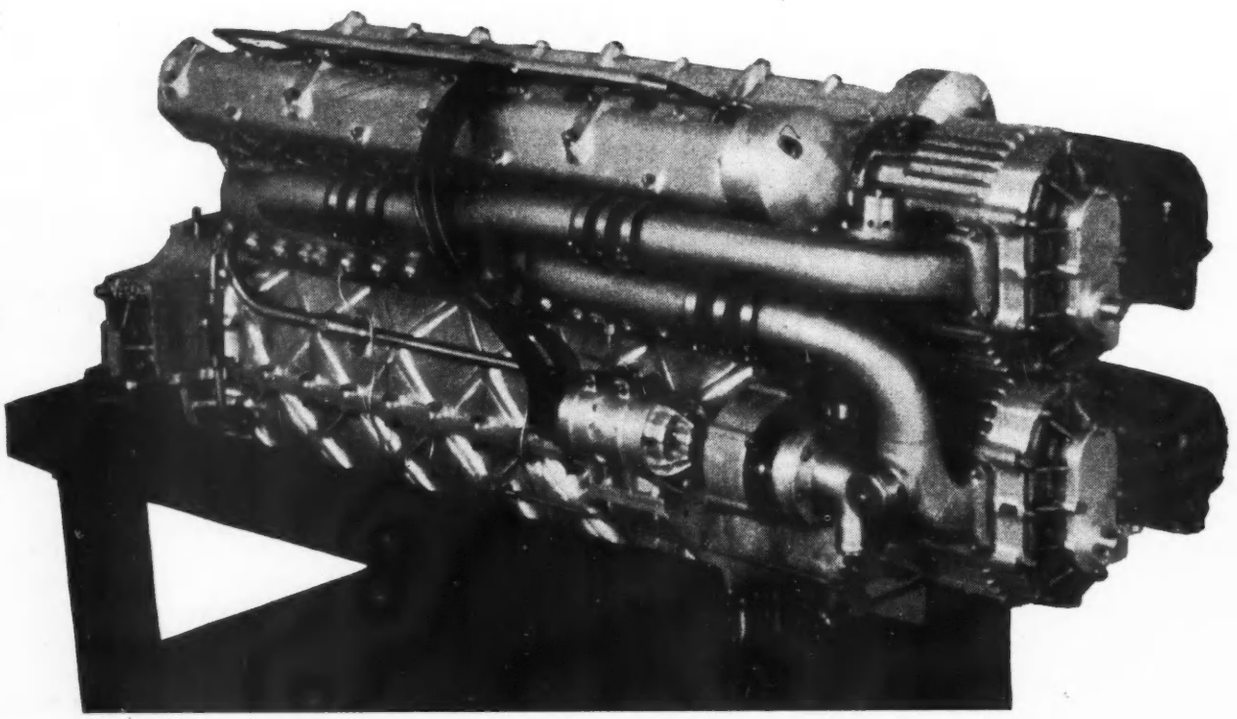
arrived at a blend which produces considerably more power without too much penalty in specific consumption. The substance is still held confidential and very few details as to its composition and behavior are available for release at this time. Lencki's cars still feature disk brakes.

Other refinements for some cars included lighter wheels with wider base rims to improve car handling and tire wear, installation of larger fuel tanks to stretch distances between pit stops, and some mechanics were converting to alcohol in unsupercharged engines. This year's list of unblown engines shows more alcohol fuel users than ever before.

The group of American-owned Italian cars also underwent detailed improvements. The Boyle Maserati

(*Turn to page* 64, *please*)

Intake side of Maserati engine of 8CL type. Note the diagonal cross ribbing on crankcase walls. Type 4CL engine is virtually identical in construction—in fact is equivalent to the front half of the 8CL.

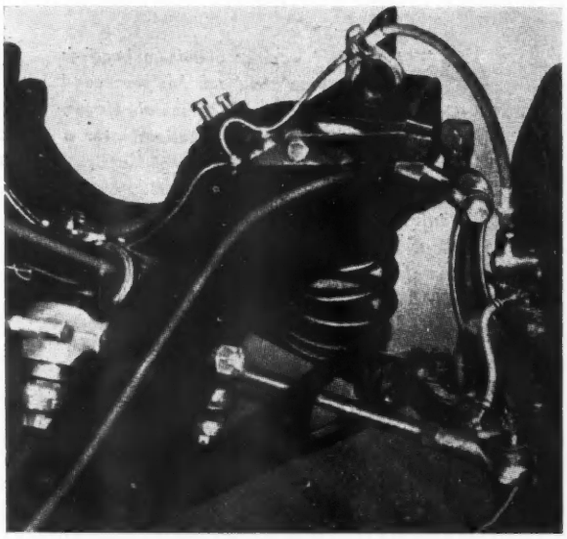


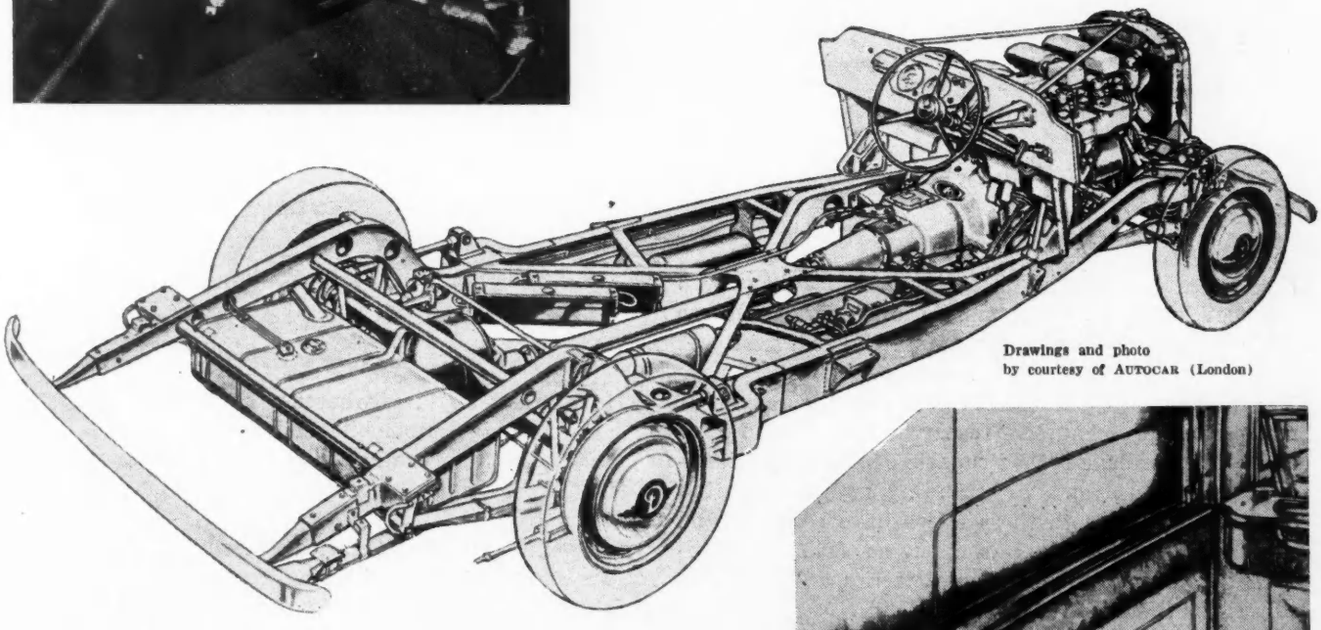
The New Daimler Models

DAIMLER CO. LTD. has added two models to its line of passenger cars of limousine body type. Powered by 333 cu in. eight cylinder and 250 cu in. six cylinder engines, the new models are among the largest built for the British market. Both engines are of the overhead valve design with a chain driven camshaft located in the crankcase. They have the same bore and stroke, 3.35 in. by 4.72 in, and a compression ratio of approximately 6.3 to 1. Full length Brivadium dry liners are used. The inlet and exhaust ports are on the same side of the engines and the inlet manifolds are water jacketed, cast aluminum arranged so that each of the two downdraft carburetors feeds half of the cylinders.

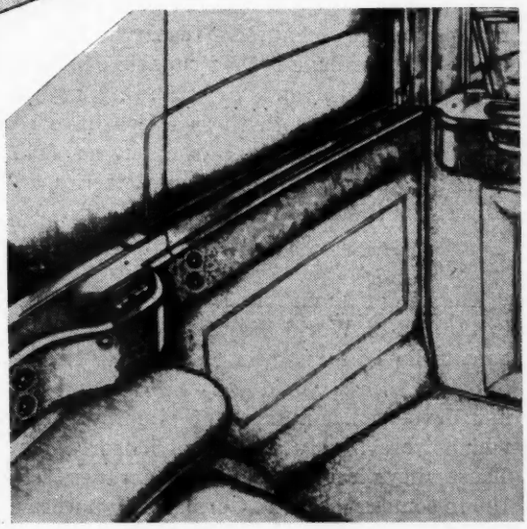
The drive system consists of a hydraulic coupling, a four-speed epicyclic preselector gear transmission and hypoid rear axle. These are the first Daimler models to use this type rear axle gearing. Radius rods to take drive and braking torque and to locate the rear axle are used with conventional half elliptical springs. As will be seen in the chassis illustration, the rods couple the axle to brackets on the frame above the front anchorage of the rear springs. The coil spring front suspension linkage is somewhat different than the conventional arrangements. The king pin of the wheel is carried in a forged yoke that is hinged to an arm which extends toward the rear to the side frame rail where it is fastened by a ball joint to allow vertical and lateral freedom, but eliminates longitudinal motion. Another link is hinged to the bottom

(*Turn to page 78, please*)





Drawings and photo
by courtesy of AUTOCAR (London)



(Top) Daimler independent front suspension.

(Center) The Daimler big six chassis. Note the rear radius rods, the built-on road jack, and the torsion bar between the rear shock absorbers.

(Right) A view of rear interior showing the overlap of the glass and the push-button switches for electrical operation of the windows.

Important

By D. B. Wood
Cleveland Development Div.
Aluminum Co. of America

Typical all-aluminum alloy split-type bearings, showing separate thrust flanges.

DEVELOPMENT work on aluminum bearings in various types and forms has proceeded through research and experimental stages, with scattered practical applications, over a period of many years. Interest and activity have, however been greatly stimulated by the relatively recent introduction of three new alloys. This latest phase, particularly, has been closely watched by AUTOMOTIVE AND AVIATION INDUSTRIES, which now presents what is believed to be the first article to be published disclosing the highly important developments of the past two years. Also, it may be said here, from a different point of view an announcement of this aluminum alloy bearing development is being presented by H. Y. Hunsicker and L. W. Kempf, Aluminum Research Laboratories, in their paper "Aluminum Alloys for Bearings" before the June meeting of the Society of Automotive Engineers.

THREE aluminum alloy bearing materials have been developed by Aluminum Co. of America for use in high-duty engines as connecting rod, main and thrust bearings. These materials — namely, alloys 750-T533, XA750-T7, and XA80S—are the results of many years of exhaustive research, and in laboratory and field tests have proved capable of giving outstanding performance and withstanding severe operating conditions. Although these alloys have so far found greatest usage in the Diesel engine field, their inherent excellent bearing characteristics will undoubtedly carry them into many other fields.

History

The use of aluminum alloys for bearings dates back to the era of World War I, when they were employed as camshaft bearings in the Liberty aircraft engines. Shortly before World War II England and Germany had developed a number of aluminum bearing alloys which were highly successful in certain applications. These alloys have high Brinell hardness which exceeds 100 in some cases. The German alloys were used mainly in aircraft engines, whereas the British alloys were also used in automobile and Diesel engines. Rolls-Royce, Ltd., for example, employed aluminum alloys in its Bentley automobile for main and connecting rod bearings.

Aluminum Co. of America started intensive research work on aluminum bearing materials in Cleveland about 1936. Experiments were conducted to find a material that would have the best bearing characteristics, even though higher mechanical properties might have to be sacrificed. Alcoa alloy 750 was the result of this experimentation, and during 1939 several sets of test bearings were furnished engine builders.

Before these experimental bearings could be given an adequate trial, however, World War II began and bearing development was curtailed in favor of war production. When restrictions on the use of aluminum were lifted in 1944, bearing development was resumed,

Engineering **Data** *on* ***Aluminum Alloy Bearings*** *for* ***Engines***

and commercial production actually got underway the latter part of that year. Alloy XA750 was introduced in 1944 after showing considerably less frictional resistance than alloy 750 in laboratory tests. The former alloy was fabricated in the form of sheet beginning in 1945.

Material

Alcoa alloy 750 contains nominally 6.5 per cent tin, 1.0 per cent copper, 1.0 per cent nickel, with the remainder being commercially pure aluminum. The alloy is normally furnished as permanent mold castings, which are given a heat treatment designated as T533.

Alcoa alloy XA750 has a chemical composition similar to alloy 750, except for an addition of silicon. This alloy is also usually supplied in the form of permanent mold castings, which are subjected to a heat treatment identified as T7.

When higher properties are desired, alloys 750-T533 and XA750-T7 can be cold worked to increase their yield strength and proportional limit. Resistance to creep, however, may not be proportional to the increase in yield strength of the material, particularly at high temperature.

Alcoa alloy XA80S has the same chemical composition as XA750, and represents nothing more than its wrought form. Alloy XA80S can be produced as flat sheet in either the annealed condition or ¼ hard temper. As yet, special sheet forms and coiled sheet cannot be supplied in this alloy.

The mechanical and physical properties of these alloys are shown in Table I on page 30.

Normally, aluminum alloy bearing materials are supplied by Aluminum Co. of America directly to regular bearing manufacturers. They, in turn, fabricate this material into finished bearings and distribute and sell them through the customary channels.

Tests

Tests conducted in the conventional connecting rod bearing machine, Fig. 1, indicate that aluminum alloy bearings can withstand more severe loading conditions and run longer than most other bearing materials. Aluminum alloy bearings have completed many successful runs of 200 to 400 hours in this machine at bearing pressures of 4000 psi, using speeds of 3600 rpm on a 2¼ in. pin.

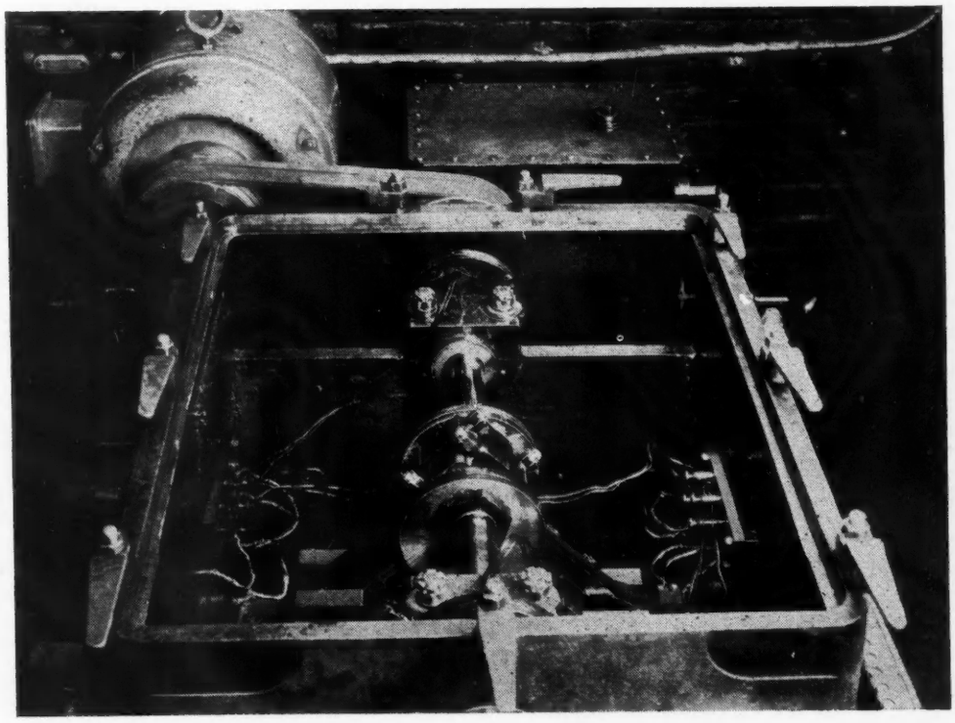


Fig. 1

Modified connecting rod bearing machine used to test aluminum alloy bearings under severe operating conditions.

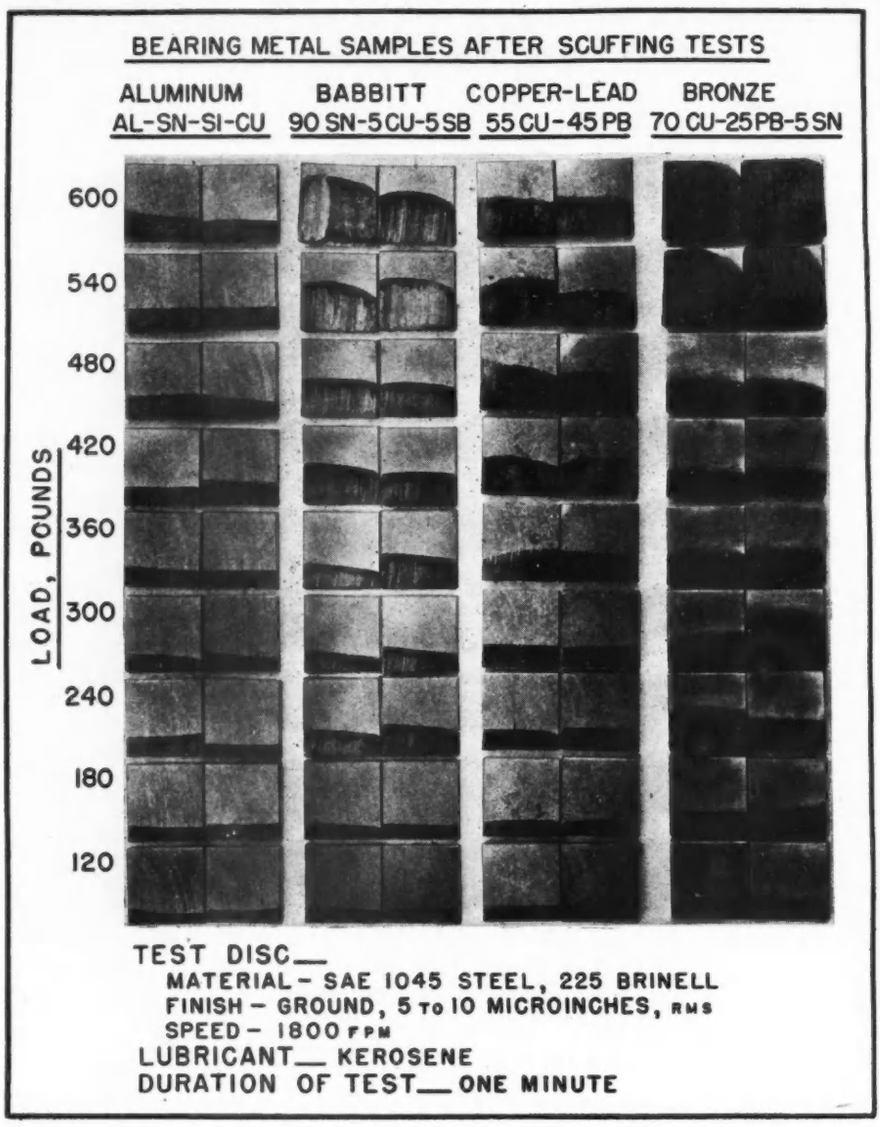
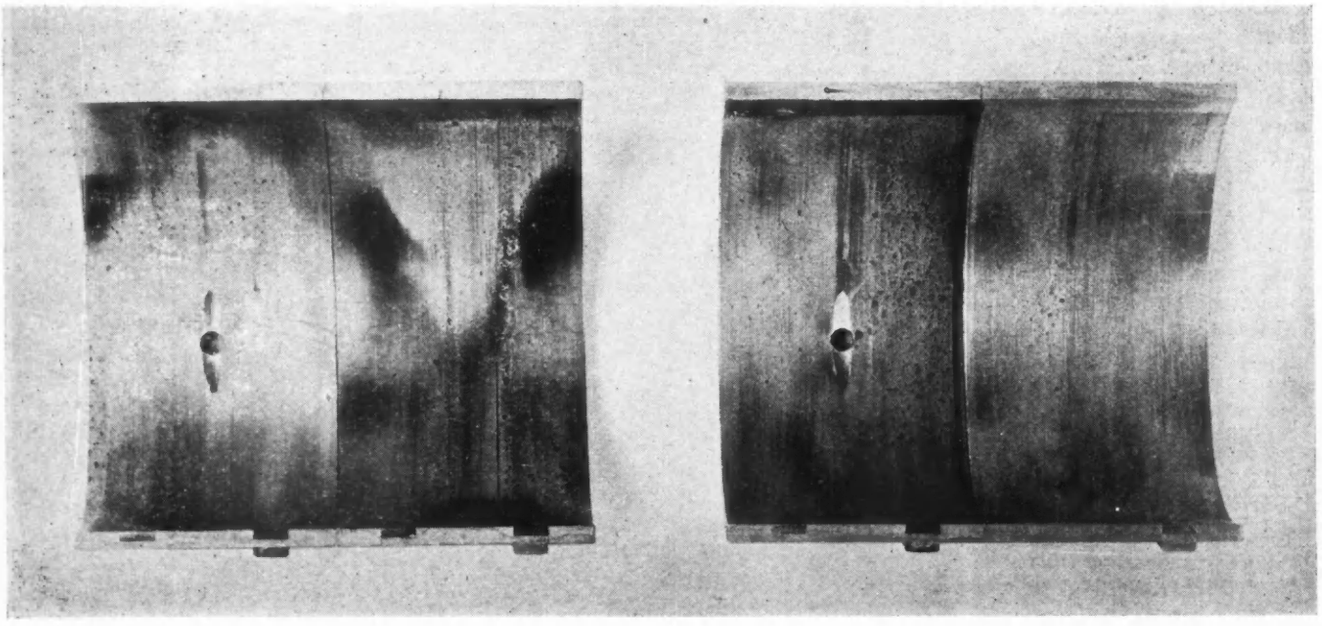


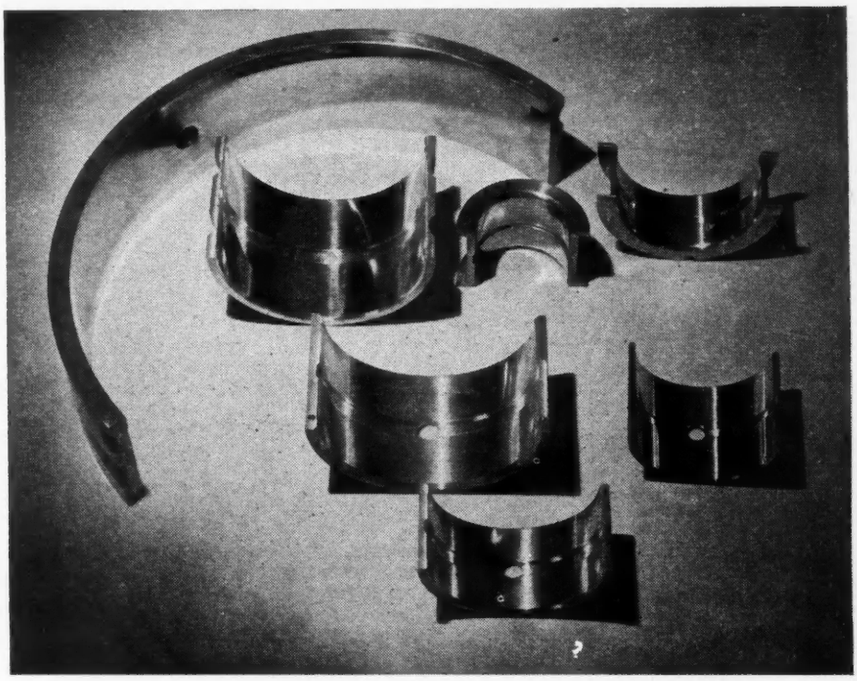
Fig. 2

Another laboratory experiment that has been employed is a scuff test, which indicates the relative frictional resistance of bearing materials under the conditions that are imposed. In this test, a specimen of bearing material, $\frac{5}{8}$ in. square by 0.1 in. thick, is held at an angle of 1 deg against the flat surface of a steel disk, which is about 4 in. in diameter. The steel disk is then rotated for one minute with the specimen under a given total load, using kerosene as the lubricant. The resulting wear or scuffing on the edge of the specimen is indicative of its relative frictional resistance and anti-scuffing qualities. Fig. 2 shows the superiority of aluminum bearing alloys over some other common bearing alloys after such a test.

Fig. 3

(Below and on the facing page) Aluminum alloy connecting rod bearings after 711 hours of operation, 600 of which were continuous at 20 per cent overspeed.





Typical all-aluminum alloy split-type connecting rod and main bearings.

Tests results conducted by engine builders using some of the first experimental bearings were so successful that aluminum bearing alloys are now being used in large quantities as main and connecting rod bearings in Diesel engines manufactured by them. Very successful tests have recently been conducted by many of the leading Diesel engine builders. Some tests have been run under conditions which were not conducive to trouble-free operation, yet in most instances the aluminum alloy bearings have shown remarkable adaptability and have given excellent service.

Several successful tests have also been completed on gasoline engines, using aluminum alloy connecting rod bearings with conventional locking lugs. One such recent test in our laboratory consisted of first a run of 111 hours of miscellaneous testing, including break-in, oil runs at full throttle, and performance tests. Following this, the engine was run continuously 600 hours at 3100 rpm (this represents 20 per cent overspeed) with full throttle. As shown in Fig. 3, the bearings were in excellent condition when removed from the engine. The two that appear lighter in color than the others have been cleaned to remove the lacquer formation.

Aluminum alloy bearing materials have several outstanding characteristics, among which are the following: (1) Simplicity and economy; (2) high fatigue strength; (3) high thermal conductivity; (4) excellent resistance to corrosion; (5) relatively low brinnel; (6) ability to minimize shaft wear; and (7) flexibility. To elaborate these advantages in turn:

1. All-aluminum alloy bearings are composed of the same bearing material throughout. Consequently, all problems associated with the bonding of dissimilar metals together with their varying behavior in service, are eliminated. Aluminum bearing alloys lend themselves well to replacement, because no allowance must

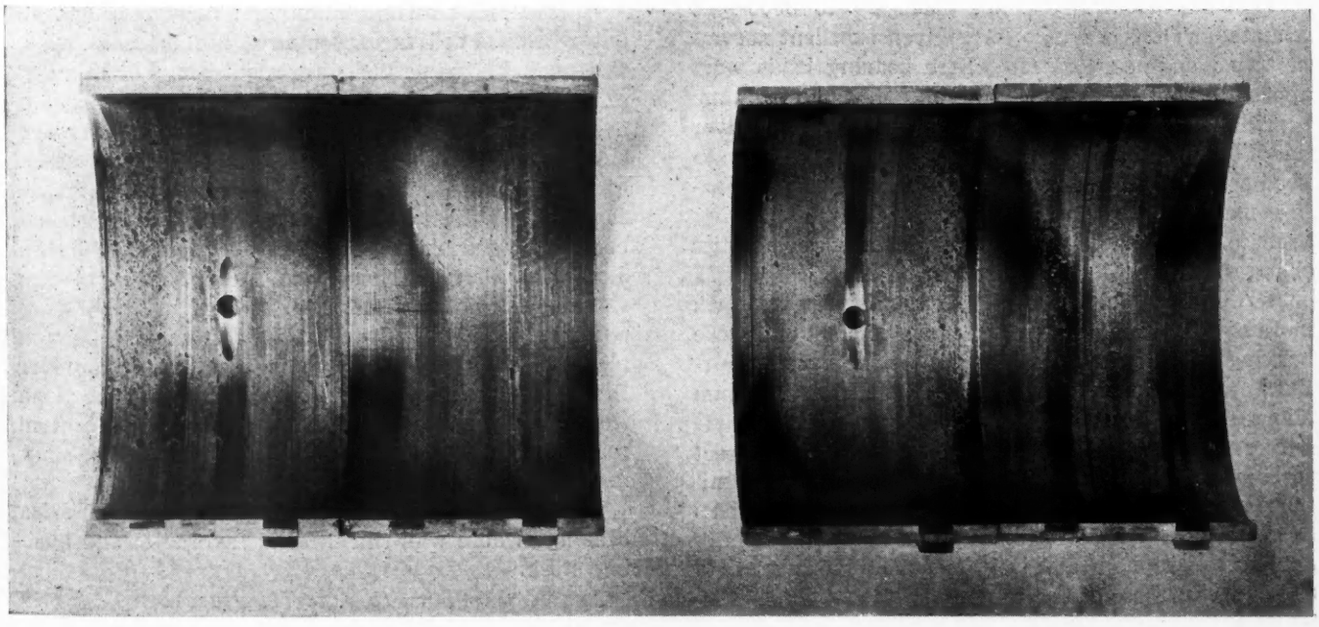


Table I

Typical Mechanical and Physical Properties of Aluminum Bearing Alloys

Properties	750-T533	750-T533 Cold Worked 4%± ¼%	XA750-T7	XA750 Cold Worked 4%± ¼%	XA80S Annealed	XA80S 3% Red.	XA80S ¼ Hard 20% Red.
Tensile Strength, psi	22,000	23,000	22,000	23,000	21,000	21,000	25,000
Yield Strength in Tension, psi (0.2% set)	10,000	16,000	10,000	17,500	8,000	15,000	23,000
Yield Strength in Compression, psi (0.2% set)	10,000	16,000	10,000	17,000	..	..	..
Endurance Limit, 500,000,000 cycles, psi, R.R. Moore Rotating Beam Test	9,000	..	9,500	..	..	..	..
Shear Strength, psi	14,000	..	14,500	..	..	..	..
Elongation, % in 2" gage length	12	8	10	7	25	15	6
Brinell Hardness	45	50	45	50	..	..	..
Rockwell "H" Hardness	75	85	75	85	75	80	95
Specific Gravity	2.88	2.88	2.83	2.83	2.83	2.83	2.83
Avg. Coefficient of Thermal Expansion, In./In./°F. from 68°F. to 392°F.	.0000135	.0000135	.0000132	.0000132	.0000132	.0000132	.0000132
Thermal Conductivity, C.G.S. Units	0.44	0.44	0.40	0.40	0.40	0.40	0.40

be made to maintain a correct proportion between the backing material and actual bearing metal facing.

2. Aluminum alloy bearings, being all one material, probably carry stresses more uniformly distributed than duplex or multiplex materials. Aluminum alloy bearings also retain their resistance to fatigue at elevated temperatures to a greater degree than these other materials.

Very high bearing loads may be carried successfully by aluminum alloy bearings. Many successful tests have been run at about 5000 psi; some tests have been completed successfully using loads up to 8000 psi. Aluminum alloy bearings have given excellent service in actual engine operation where bearing loads were approximately 3750 psi. In general, the aluminum bearing alloys will carry loads about equal to silver lined bearings, and their embedibility is almost as good as babbitt lined bearings. Aluminum alloy bearing materials can be substituted for the bearing bronzes in most applications without any design changes, and excellent service can be expected.

3. Aluminum bearing alloys transfer heat much more rapidly than do bearings made of steel or bronze backing with some other material as the bearing surface, or solid bearings of other materials. Aluminum alloys tranfer heat at a ratio of about three to one with respect to steel, and about five to one with respect to babbitt. Being of mono-metal construction, aluminum alloy bearings have no bonding planes to act as heat dams. Possible localized high temperatures are avoided by rapid heat dissipation and transferral to the outer surfaces of the bearing.

4. Aluminum alloy bearings are highly resistant to corrosive attack from additive oils. Since these oils may be very useful in reducing carbon and varnish formation as well as increasing film strength and "wetness," they may be used without fear of paying a penalty in the form of bearing corrosion.

5. The Brinell hardness of the aluminum bearing alloys is lower than that of the "bronzes" and their ability to embed or include dirt particles is nearly as good as that of babbitt. The material has sufficient ductility, however, to conform readily to the housing or to any misalignment of the journal. Furthermore, its relative high compressive strength enables it to overcome any tendency to squeeze out under load.

6. In the event of bearing failure, the crankshaft or journal will not be seriously scored when aluminum alloy bearings are used, because there is no bearing surface to wear through and expose a hard backing material. This is a vital factor when the cost of the shaft or journal represents a relatively large sum of money as in the case of Diesel engine crankshafts. Wear and failure of such parts become especially critical when machines are operated in districts that are remote from mechanical service and centers of distribution.

7. By combining different methods of manufacture and incorporating different subsequent treatments, flexibility is obtained through a wide range of mechanical properties. As a result, a great number of different type applications can be successfully accomplished with the same basic materials.

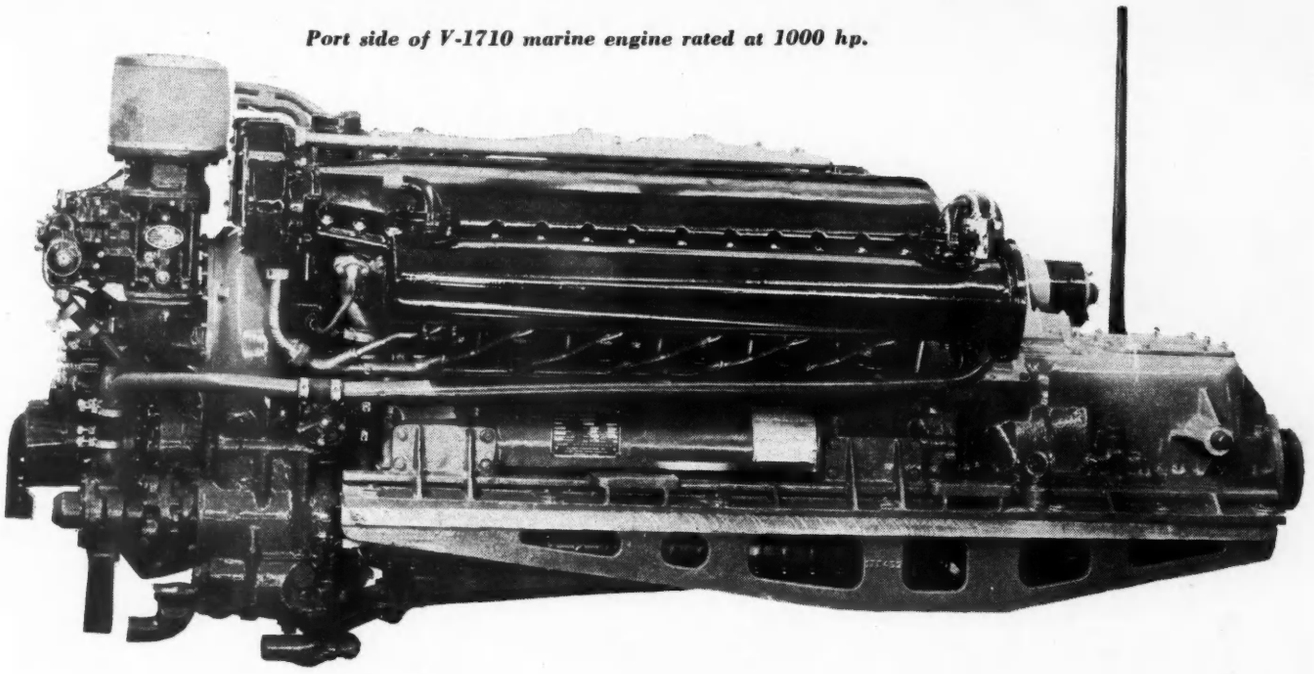
At the present time, aluminum alloy bearings are not recommended for automotive use in cases where thin-walled bearing shells are required. For this type of bearing, steel-backed aluminum alloy bearings are available at the present time and seem to offer considerable promise. Such materials permit the use of high bearing pressures, have good conformability, and some tests indicate that most of these have excellent bond characteristics. One type of these steel-backed aluminum alloy bearings uses Alcoa XA80S bearing sheet as the lining material.

For some applications, alloy XA80S may be used alone in sheet forms. Engine tests show, however, that the cast materials have somewhat better frictional characteristics than the wrought material. In general, recommendations for the aluminum bearing alloys may be classified as follows:

Alcoa 750—Diesel engine; split type or cylindrical bearings where wall thickness is favorable; and bushing stock.

(*Turn to page 74, please*)

Port side of V-1710 marine engine rated at 1000 hp.



Marine Conversion of Allison V-1710 Aircraft Engine

BASED on its 25 years' experience in converting and building high speed, light weight marine engines, The Vimalert Co., Ltd., Jersey City, N. J., has undertaken the marine conversion of the Allison V-1710 aircraft engine as shown in the accompanying photograph. This conversion has been test-run and approved by the Government.

With the thought of obtaining a high factor of endurance the marine conversion has been rated at 1000 hp, although the present aviation ratings are considerably in excess of that figure. Reverse power has been set at 300 hp. Arrangements are being made so that The Vimalert Co. will: 1. Supply the complete conversion, including the engine; 2. Convert the customer's engine at the factory; 3. Supply the conversion kit to the customer to make his own conversion. The following parts are included in the kit: reverse gear assembly, marine thrust bearing, engine-reverse gear assembly support rails, exhaust manifolds, sea water pump, starter motor, starter relay and Bendix drive, flame arrestor, and special tools.

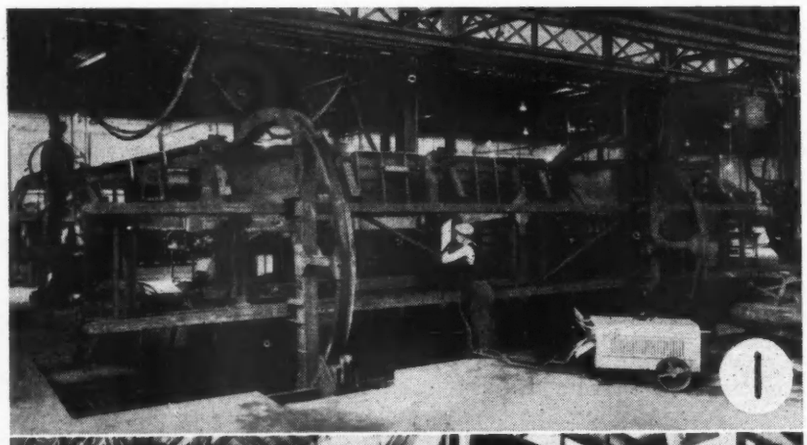
Either right or left hand rotation is available and the drive is direct. For relatively high speed boats such as cabin cruisers, racing boats, patrol boats, rescue boats and similar craft the standard direct drive engine is used. However, the addition of a reduction gear which provides the necessarily low propeller rpm makes the conversion entirely suitable also for work boats or other slow speed craft. The result is an exceedingly light and compact propulsion unit weighing 2250 lb, including all material regularly furnished in the kit. The overall length is 96 in. The major marine additions and changes required to make the conversions are as follows:

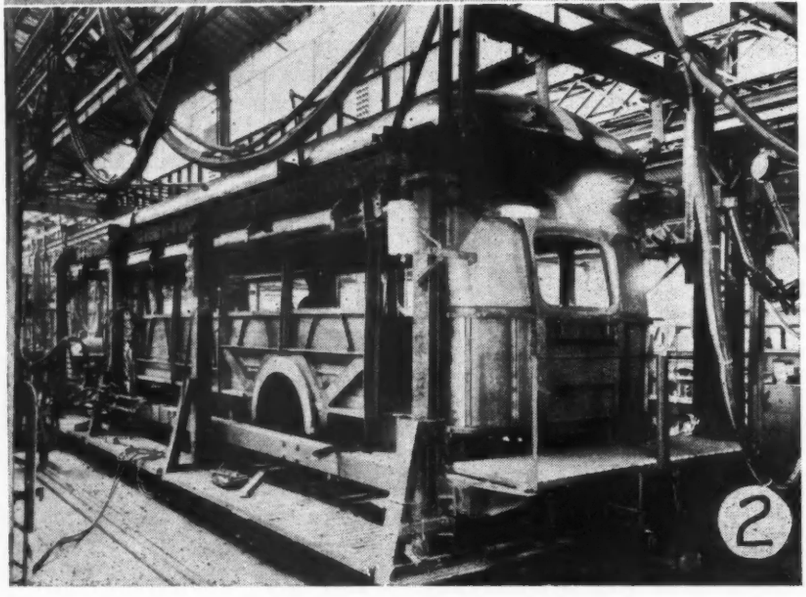
The nose of the engine is removed and in its place is substituted a marine reverse gear unit which is bolted directly to the crankcase flange. The reverse gear is of the bevel gear, planetary type operating in conjunction with a multiple disk clutch to give the forward, neutral and reverse conditions. The entire engine-reverse gear assembly is mounted on cast aluminum alloy engine bearers. A heavy duty starter is mounted on the reverse gear case and cranks the engine through the flywheel, which is furnished in the kit.

The former starter pad is used for mounting a sea water pump. Engine cooling is by fresh water. The existing aircraft centrifugal pump provides circulation of the fresh water which is cooled by sea water through heat exchangers. A special marine type air cleaner and flame arrestor has been provided at the entrance to the induction system. The exhaust manifolds are of fabricated copper and are entirely water jacketed.

Chausson 44 passenger integral bus.

Chausson Enters Bus Field





SHEET steel construction with spot welding, to the almost total exclusion of bolts and rivets, are the structural features of the light weight integral motor coach now in production in France by the Chausson Co. Originally radiator specialists, this firm extended to sheet metal work and, with a very modern plant, specialized on bodies and truck cabs for Ford and other automobile manufacturers. It was during the German occupation that plans were laid for going into production on an all-metal integral coach with monocoque body.

The sheet steel principle has been pushed to such a degree that even the front axle is built up of sheet steel, welded into box section. The steering knuckles, brakes, and mounting of the springs follow normal practice. This appears to be the only sheet steel welded box-section axle in production in Europe. It is claimed that it offers reduced weight for given strength,

1. Main platform of the Chausson coach in the revolving jig in which it is spot welded.

2. Chausson bus assembly line.

compared with the usual type of forged axle used.

Providing 44 seats, having a wheelbase of 202 in., an over-all length of 393 in., a width of 98 in. and an internal height of 78 in., the bus weighs five tons. Its normal load is five tons, but it is guaranteed for an overload bringing its total weight up to 12 tons. While there are only 44 seats many operators find it possible to pack 100 people into the coach during peak traffic hours.

The press work is done in a specialized factory and the parts brought to the main assembly plant where two parallel assembly lines are working. One receives the individual pressings, assembles them in jigs, and spot welds them into units to be passed across to the main assembly line. The first essential unit is the platform with wheel arches, reinforced to receive the engine and the axle attachment. The uprights are next welded into position and the single-piece room, built up on the outer assembly line, is swung over and welded in place. Box sections are used throughout. In the case of the side panels the outer skin is held on by screws to give access to the windows and window lifting mechanism. Generally, however, the outer skin is welded to the ribs and stringers, after the inner surfaces have been treated

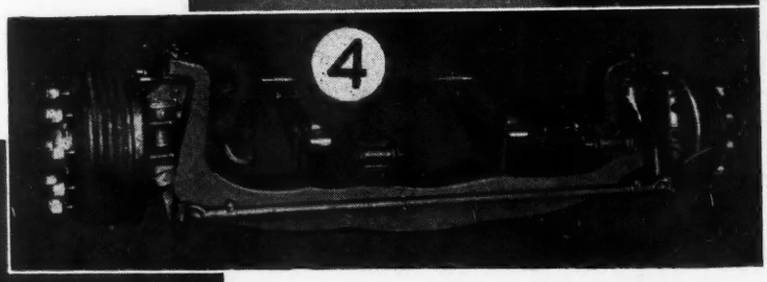
(*Turn to page* 70, *please*)

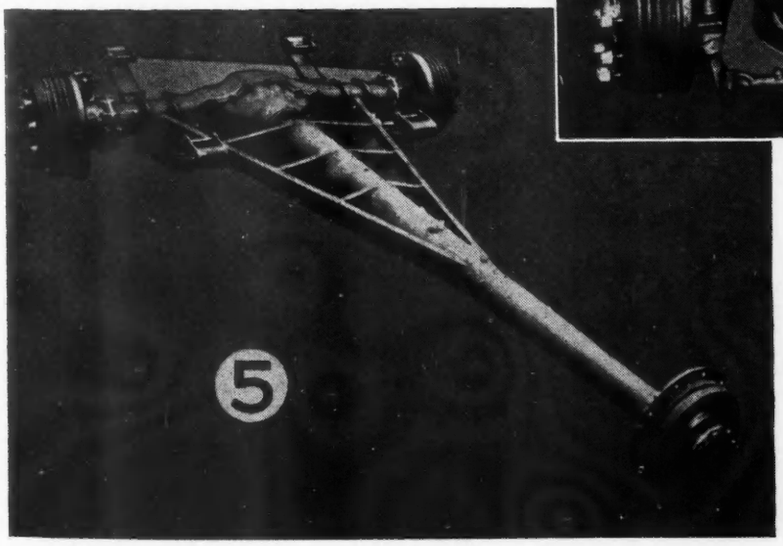
in France

First model is integral type and features welded sheet steel body

By W. F. Bradley

Special Correspondent of AUTOMOTIVE *and* AVIATION INDUSTRIES in France

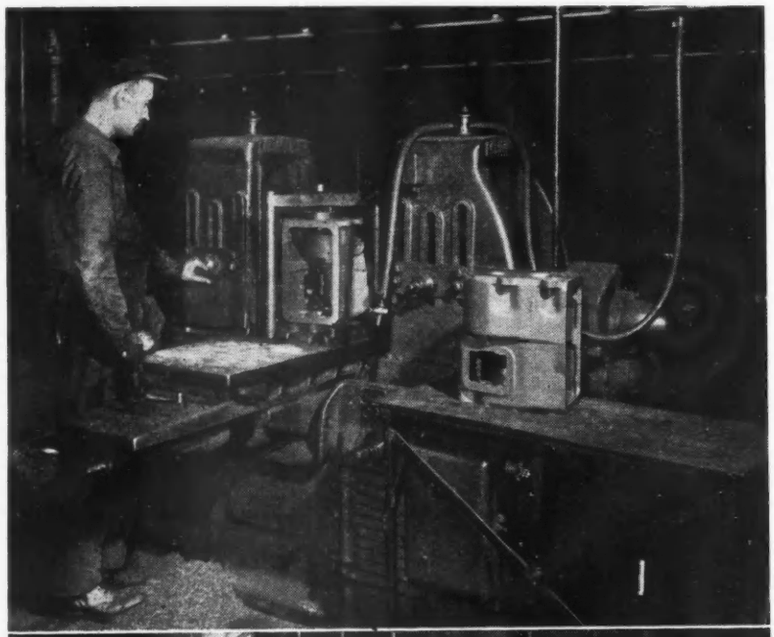


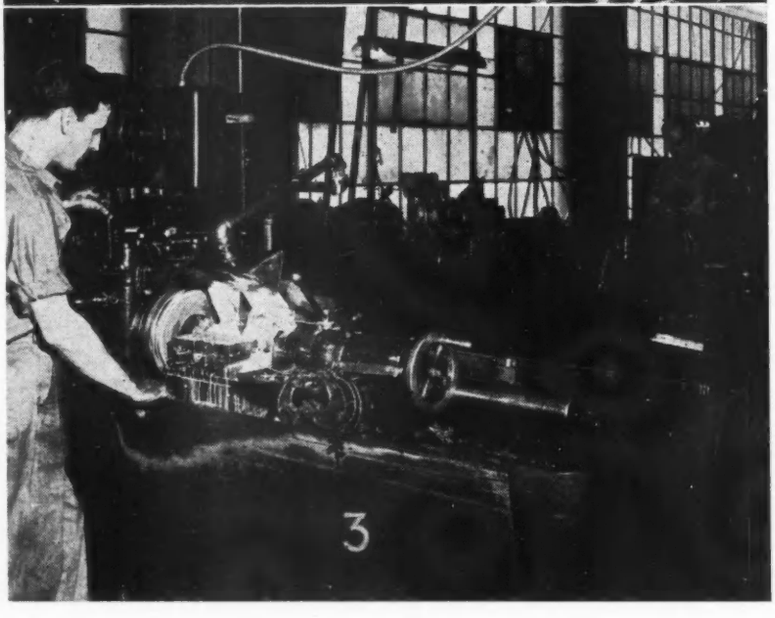


3. Engine installation by the side of the driver's seat (hood removed).

4. Chausson coach front axle fabricated from sheet steel.

5. Double reduction rear axle with welded sheet steel stiffeners on torque tube.





Fuller's

RECOGNIZED as one of the leading producers of transmissions for heavy duty vehicles of all kinds, the Fuller Manufacturing Co., Kalamazoo, Mich., recently completed the initial phases of its plant re-arrangement for postwar production. Although other changes and improvements will be made progressively as time goes on, the present layout is modern in concept and well developed for an operation which is required to manufacture economically a wide variety of transmissions.

A brief comment on the engineering features of the current Fuller line will be helpful in an understanding of the production setup. Recently Fuller announced its new models —quiet running heavy duty units some of which are equipped with helical gears for all forward speeds. Among the features of these transmissions are—constant mesh gearing, the use of overlapping helical gear trains to eliminate high load concentration at the acute angle, and the use of "crowned" gear teeth. The "crowning" operation, performed on Michigan Tool circular cutter gear shaving machines, is designed to relieve the ends of gear tooth surfaces, thereby assuring a maximum of uniform tooth loading.

To further increase transmission life, Fuller uses the shot peening method on all gears subjected to high stress and sustained use. Our read-

1. ***One of the Milwaukee Duplex milling machines in the transmission case department.***

2. ***Among the items of general purpose machinery in the plant is this large capacity Gisholt turret lathe.***

3. ***Gear blanks and shafts are turned on a battery of Fay automatic lathes such as the one shown here.***

Reorganized Setup

for Postwar Production of Transmissions

By Joseph Geschelin

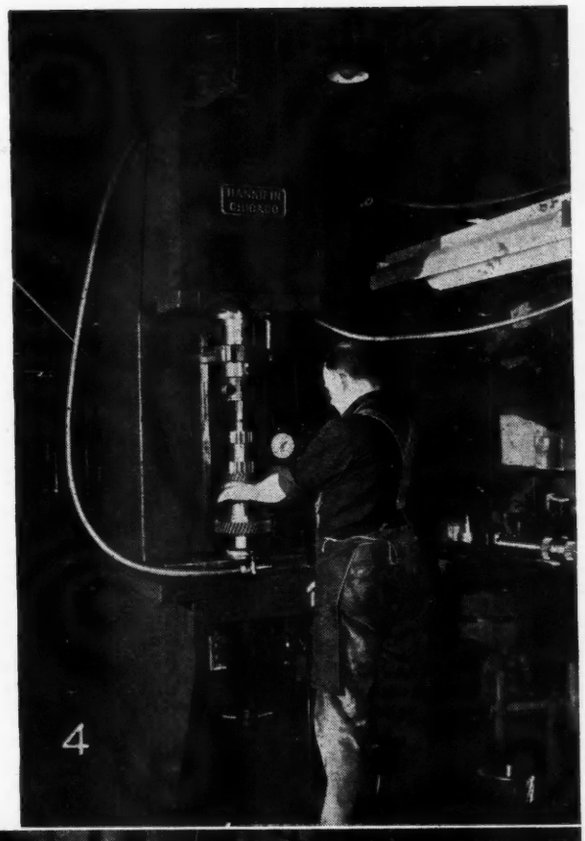
ers are familiar with this procedure which was developed by J. O. Almen of General Motors Research as a means of reducing failure due to fatigue. As will be described later, shot peening is done in a specialized machine developed by the American Foundry Equipment Co., producers of the familiar Wheelabrator line.

The plant layout takes advantage of the new buildings placed in operation during the war. Of these, the larger unit has been equipped for the machining of transmission cases, covers, clutch housings, and other major castings. The smaller building is devoted entirely to facilities for experimental work and includes machine shop equipment as well as dynamometers and other test machinery.

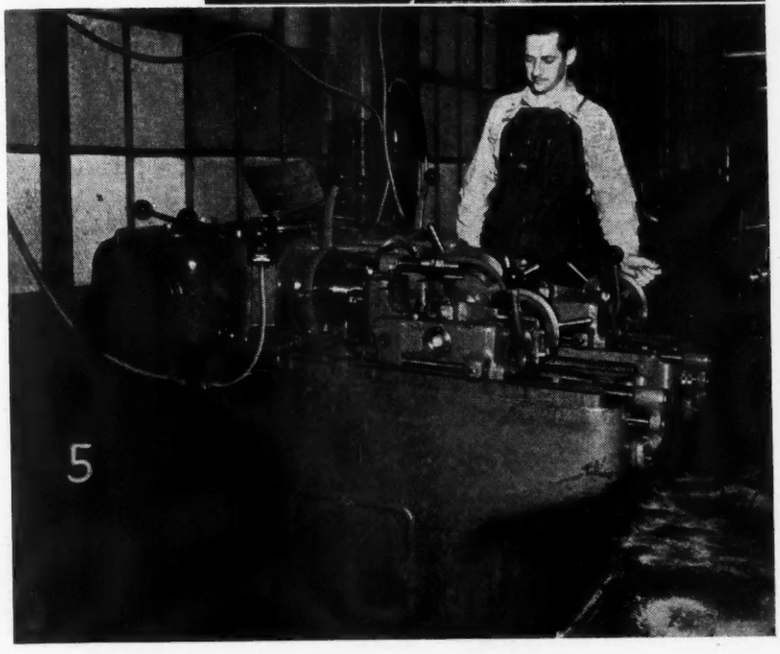
Before the war, the plant was arranged by functional departments and all parts were routed through on a job lot basis. Today the newly arranged departments are designed to handle a family of parts which are routed over integrated production lines designed to complete the necessary operations from start to finish. The only exceptions to this are the grinding and heat treating departments. Owing to the great variety of product it was found more economical to route parts requiring grinding and heat treatment through single general purpose departments.

Flexibility of lines and individual machines are the

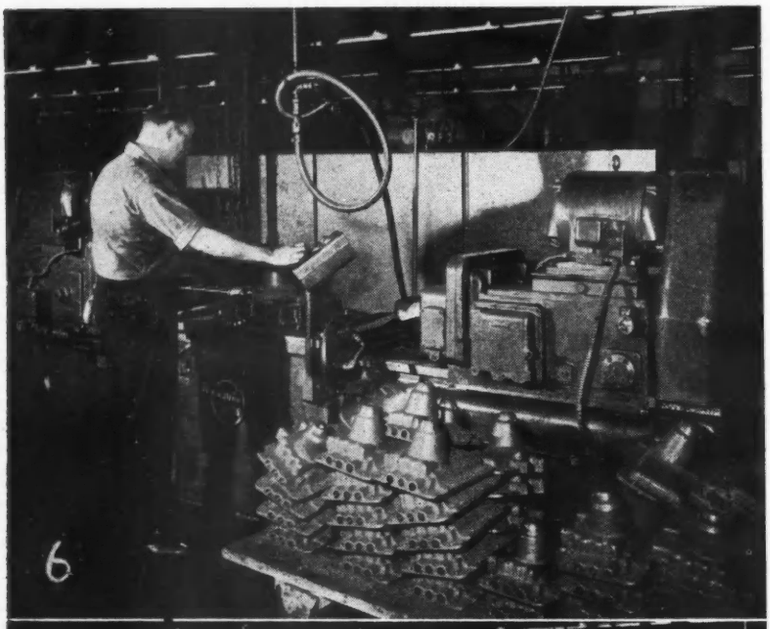
This is the 118th in the series of monthly production features

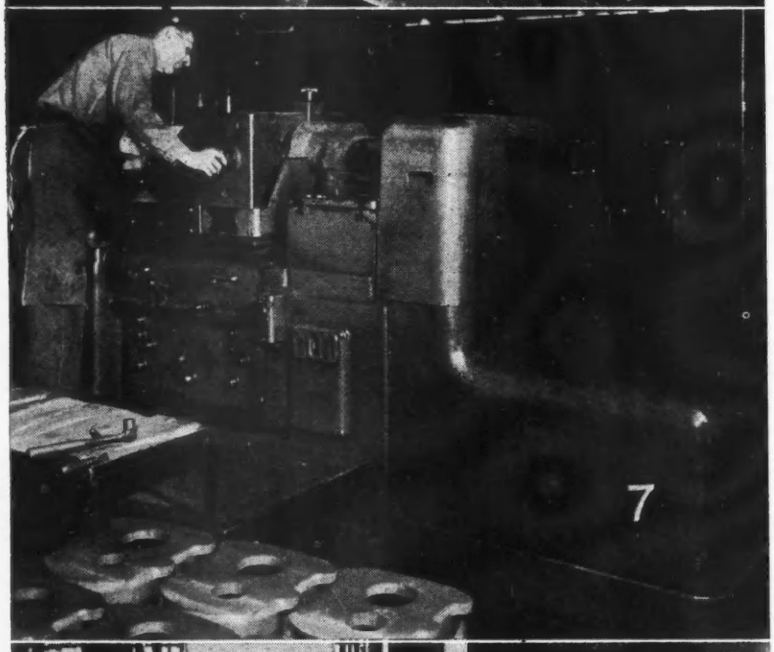


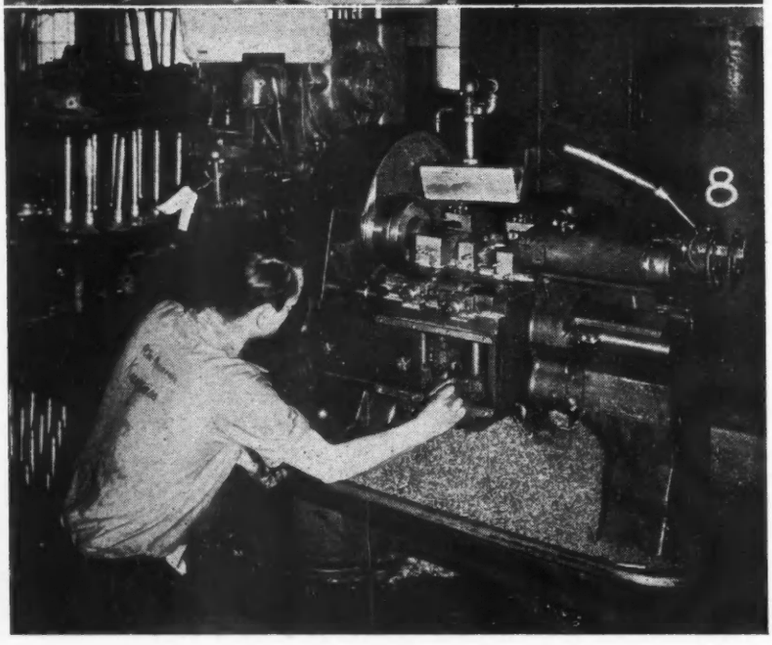
4. ***Touch of modernity on the transmission assembly line — heavy duty Hannifin hydraulic press used for pressing gears onto transmission shafts. Fast and accurate, this method supplants the previous arbor press operations.***



5. ***Interesting piece of equipment is this two-spindle Landis threading machine used for producing a precision thread on shaft ends.***







chief characteristic of the Fuller setup. Each of the production lines must be capable of handling a wide variety of similar parts, and consequently is designed for quick changeover of tooling and fixtures. This places emphasis upon universal and unit-type machinery in contrast with the special purpose equipment found in mass production plants dealing with only one or a few variations. Even here it has been possible to use a few single- purpose machines, as will be noted later.

To give some idea of the production scheduling problem involved in keeping the flexible lines going on an economical basis, we list below some of the major parts in process together with the average number of variations in a given month: Yokes — 40; Spline shafts — 25; Yoke bars—26; Cases—27; Covers — 19; Flanges — 9; Miscellaneous gears — 100; Drive gears — 20; Countershafts—15; Bearing covers —18; and Shifting levers—20.

The layout of departments is rather simple and consists of the following:

Department 13 is the new building with individual lines for transmission cases, covers, and flanges. To provide a picture of the flow of work here, a factory routing of a typical transmission case is presented elsewhere in this article. Interesting feature of case machining, as shown on the routing, is the newly adopted procedure starting with the milling of the cover face on an Ingersoll machine, milling of the front and rear end on a Cincinnati Duplex milling machine, followed by precision boring

6. ***This horizontal W. F. & John Barnes drilling machine has been flexibly tooled for the drilling and reaming of yoke bar bores in some 45 different covers.***

7. ***As described in the text, this is one of the heavy duty Heald precision boring machines installed in the case lines for the precision boring of transmission cases.***

8. ***Large Model R Lo-Swing lathes, one of which is seen here, are used for the high speed turning of a variety of transmission shafts.***

Transmission Case Routing

OPERATION AND EQUIPMENT

Mill cover face—**Ingersoll milling machine.**

Mill front and rear end—**Cincinnati Duplex milling machine.**

Bore main and countershaft holes and counterbore—**Heald Bore-Matic.**

Mill power take-off pads—**Kearney & Trecker Duplex mill.**

Drill power take-off pads—**Barnesdril press.**

Drill cover face; drill rear end; drill ear on front end—**Natco multi-drill.**

Drill front end complete—**Baush multi-drill.**

Drill and tap oil drain hole—**Barnesdril press.**

Drill and tap idler hole—**W. F. & John Barnes horizontal drill.**

Sweep idler bosses—**Cincinnati-Bickford drill.**

Counterbore M.S. holes—**Colburn single spindle drill.**

Cut ring grooves—**Barnesdril press.**

Tap cover face; tap front and rear ends—**Hammond flex arm tapper.**

Tap (2) 5/8 holes front end; Tap 4 holes rear end—**Garvin tapper.**

Tap PTO holes both sides—**Hammond flex arm tapper.**

Hand ream idler holes—**Bench.**

Wash—**Fulco washer.**

File all burrs—**Bench.**

Second Speed Sliding Gear Routing

OPERATION AND EQUIPMENT

Drill—**Baker single spindle drill.**

First round broach; spline broach—**Oil Gear Broach.**

Rough and finish turn—**Fay automatic lathe.**

Countersink and ream first end—**Barnes single spindle drill.**

Cut 30 deg angle and counterbore size—**Foster turret lathe.**

Countersink and ream second end—**Barnes single spindle drill.**

Rough cut teeth on clutch, finish cut teeth on clutch—**Fellows Hi-Speed shaper.**

Cut teeth from solid—**Barber-Colman hobbing machine.**

Chamfer teeth large gear; recess every other tooth on small gear and chamfer—**Cross chamfer machine.**

File all burrs and wire brush clutch, burnish spline, wash—**Bench.**

Shave and green grind OD—**Michigan tool shaver.**

Wire brush OD after shave and wash—**Bench and washer.**

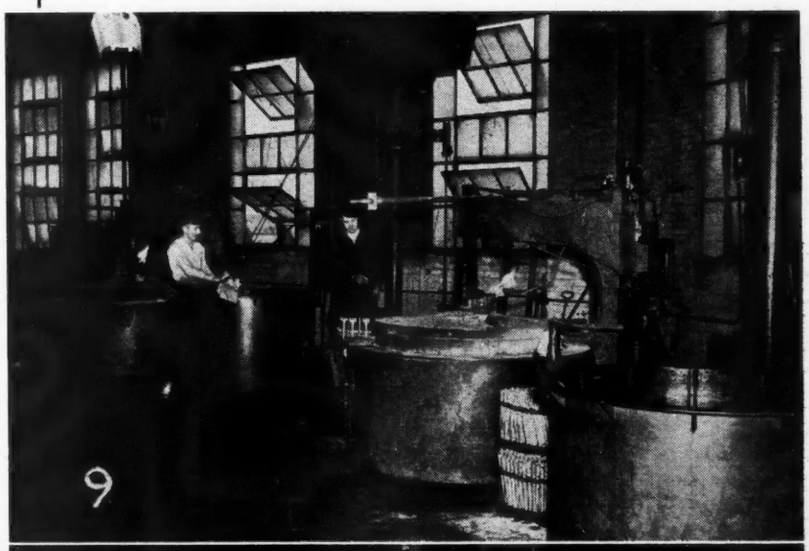
Heat treat—**Surface Combustion continuous furnace.**

Grind hole—**Bryant internal grinder.**

Wash—**Washer.**

9. ***Another view in the heat treating department showing a battery of Leeds & Northrup HomoCarb furnaces for heat treating shafts.***

10. ***Loading station of the large continuous surface combustion gas carburizing furnace.***



of main and countershaft bores and counterbores on a large Heald Bore-Matic. It is believed that Fuller is one of the few—perhaps the only one—to use the Heald for heavy duty transmission case boring.

In the interest of flexibility as many as seven different cases can be handled in one of the universal fixtures used with this machine, thus materially reducing the change-over time from one case to another. Center distance variations for different cases are han-

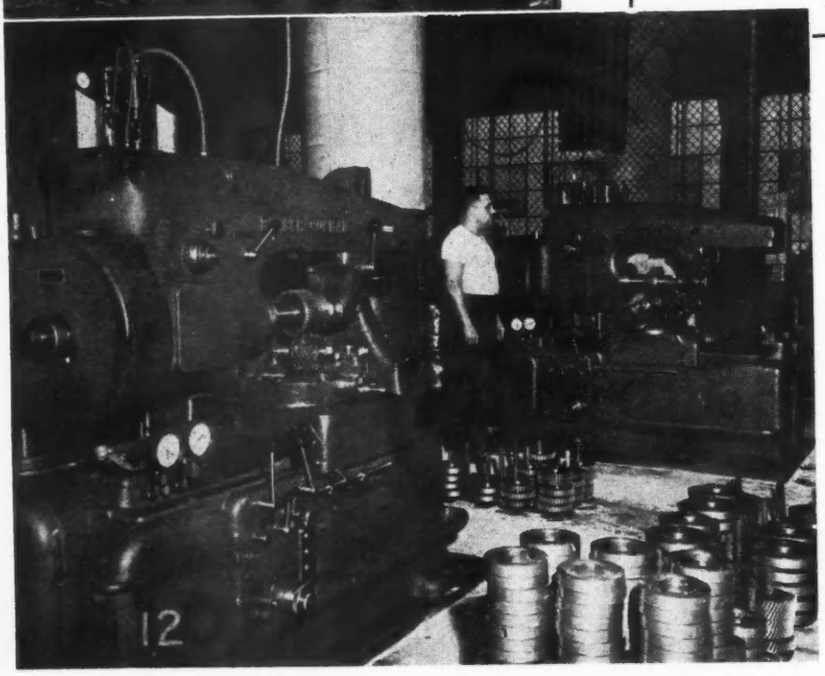
dled simply by installing spacers of suitable thickness between the boring heads. Variations in diameter of bores also are readily accommodated by adjusting the quills in the boring heads. The quills are so designed as to be readily adjusted in steps of 0.0001 in. by turning a vernier micrometer sleeve. All boring and counterboring tools are Carboloy-tipped.

Another outstanding piece of equipment in this department is the two-way W. F. & John Barnes horizontal drilling machine for drilling and reaming the yoke bar holes in control covers. This is one of the few special purpose machines found in the plant. Consider that the one machine must be capable of handling some 45 different types of covers and you can visualize the remarkable flexibility of the arrangement. The problem of taking such variety in their stride was solved by cooperation between engineering and production. Since the maximum number of shift rods in any of the Fuller transmissions is four, the machine has four spindles at each end, the tools being changed for drilling and reaming. Although the number of bores and diameter of bores will vary with the model, the engineering department has standardized on the spacing

Splined Mainshaft Routing

OPERATION AND EQUIPMENT

Center both ends—**Star centering machine.**
Rough and finish turn clutch end complete—**Fay automatic lathe.**
Cut off and recenter—**Engine lathe.**
Rough and finish turn universal joint end complete—**Fay automatic lathe.**
Cut off and recenter—**Engine lathe.**
Green grind universal joint end—**Norton grinder.**
Hob large spline and break corners and burr; hob clutch and burr; hob universal joint spline and burr—**Barber-Colman hobber.**
Mill keyway (2)—**Whitney No. 6 milling machine.**
Cut threads—**Warner & Swasey No. 6 screw machine.**
Drill cotter pin holes and clean centers, chase threads—**Atlas single spindle drill press.**
Mill long keyway between splines—**Rockford milling machine.**
Heat treat and straighten—**Surface combustion—Continuous furnace.**
Rough and finish grind pilot bearing; rough and finish grind 2.000-2.005 size; rough and finish grind 2.3130-2.3125 size; rough and finish grind 1.9687-1.9682 rough and finish grind 1.748-1.746—**Norton external grinder.**
Grind clutch spline—**Reid automatic surface grinder.**
Grind large spline—**Fitchburg straight spline grinder.**
Grind 1.751-1.748 length; grind 2.233-2.230 length; grind 7.473-7.463 length—**Oesterlain #3 Ohio universal grinder.**
Polish end of spline—**Blount speed lathe.**
Wash—**Crescent Model 1C metal parts washer.**



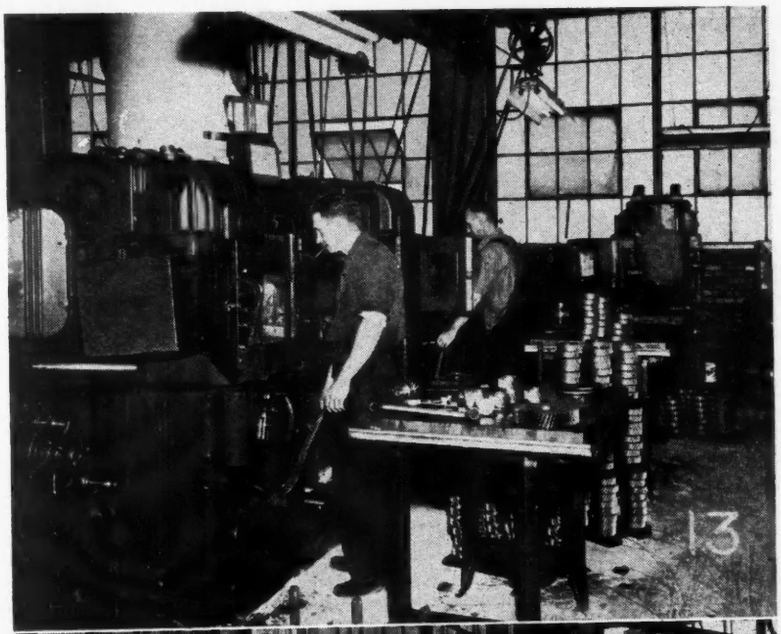
11. ***End view of a large Blakeslee Niagara washing machine of latest type installed in the grinding department.***

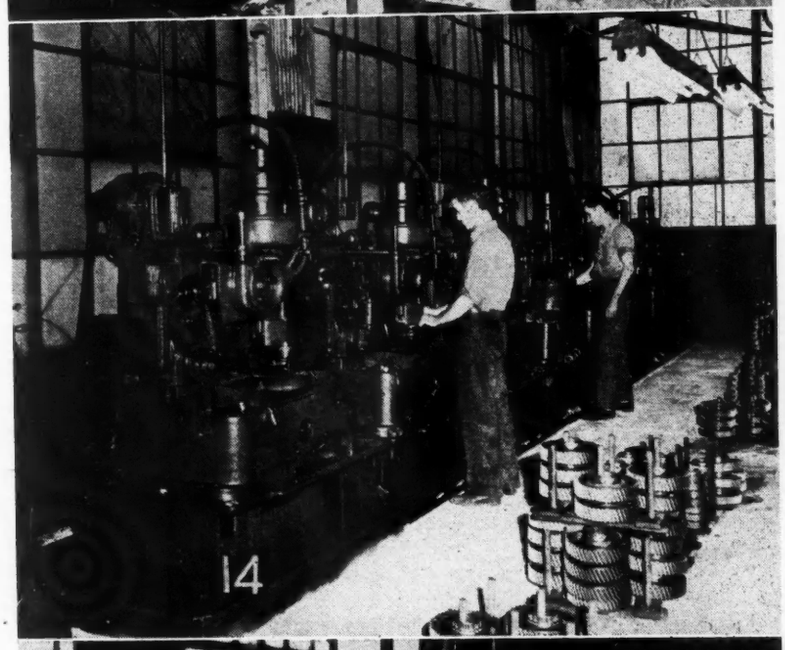
12. ***Barber-Colman hobbing machines of various types and sizes are found in the plant. Here is shown part of a battery of the latest Barber-Colman Type D hydraulic hobbers designed for rapid cutting of large gears.***

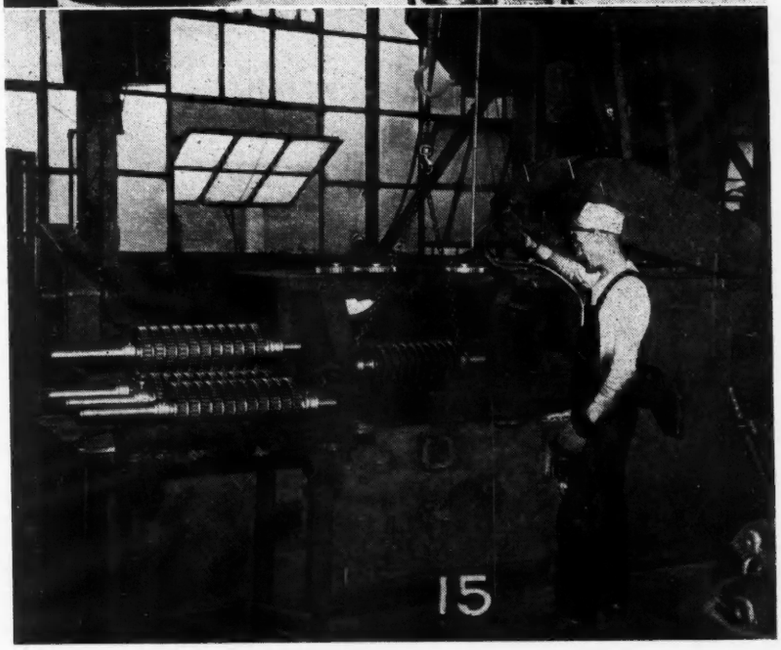
of shift rods so that all transmissions have the same spacing. This makes it necessary only to change the number and size of tools to accommodate any type of cover.

Department 11 contains the automatic screw machine department, the splined main-shaft line, and the initial —drilling and broaching—operations on flat gear blanks. The flat gears then are transported to the gear department, Department 12, for finishing. Here will be found equipment for turning and miscellaneous operations, followed by gear cutting on batteries of Fellows gear shapers and Barber-Colman gear hobbers. Fellows gear shapers are used principally for internal gears while the Barber-Colmans are used for external gear teeth and spline cutting. This department also boasts a battery of six of the new Michigan Tool gear shavers of circular cutter type which are arranged for straight shaving or for "crowning" as the case may be.

Department 20 is arranged in lines for producing drive gears and countershafts, an example of a drive gear being given on the factory routing reproduced here. Shift levers and other parts also are machined in this department. Looking at the routing we find an outstanding example of high speed turning on the large Model R LoSwing lathes. This particular shaft has a rough diameter of 2¾ in. Carboloy-tipped tools, Grade 78B, are provided with a double chip breaker. Speed is 254 rpm, depth of cut—¾ in., cutting speed 182 fpm., feed per revolution—0.019 in. A soluble oil mixture is used for the cutting fluid. Gear Department 12 serves Department 20. An interesting item of equipment in Department 12 is a two-spindle Landis threading machine for threading the ends of shafts.



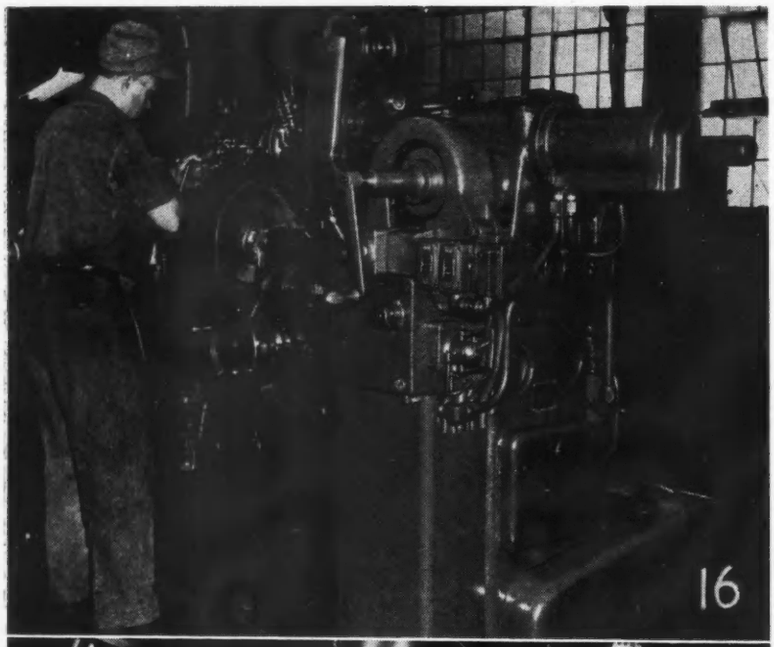




13. ***One of the batteries of Michigan Tool gear finishing and crowning machines found in various departments of the plant.***

14. ***Here is one of a number of batteries of the familiar Fellows gear shapers.***

15. ***Close-up of unloading station of the American Foundry Equipment shot blasting machine in the heat treating department. This view shows the unloading of a batch of shot blasted gears.***



16. *Among the most modern machines in the Fuller plant is this Bryant internal grinder which is located in the grinding department.*

17. *In the new case department—Cincinnati Duplex milling machine shown in one of the high production lines for the milling of transmission case faces. The universal fixture handles as many as seven different cases.*

Control Cover Routing

OPERATION AND EQUIPMENT

Drill out tower—**Colburn drill.**

Mill flange—**Milwaukee mill.**

Drill flange—**Natco multi-drill.**

Mill sector bosses—**Kearney & Trecker mill.**

Ream (2) flange holes—**Atlas drill press.**

Drill yoke bar holes; ream yoke bar hole—**W. F. & John Barnes horizontal 2-way machine.**

Bore tower inside; face tower to length and bore; drill and ream locking ball hole; drill position finder hole; ream position finder hole—**Barnesdril press.**

Drill sector bosses—**Cincinnati-Bickford drill.**

Tap sector bosses—**Garvin tappers.**

Counterbore yoke bar hole; drill (3) oil return holes; drill pin hole; spot face pin hole—**Barnesdril press.**

Line ream yoke bar holes—**Air chuck reamer.**

Wash and brush loose paint—**Fulco washer and bench.**

The general purpose heat treating department, Dept. 16, contains the Pangborn shot blasting equipment as well as the automatic American Wheelabrator shot-peening machine. For heat treatment of gears, Fuller has adopted the gas carburizing method using the familiar Surface-Combustion continuous gas carburizing furnace with pusher type conveyor feed. In the interest of quality, in addition to the precise control of temperature of the furnace, the metallurgical laboratory also makes a daily check of gas analysis to make sure that the gas atmosphere is up to standard.

The variety of shafts, on the other hand, are hardened in vertical position in a battery of Leeds & Northrup HomoCarb furnaces.

The American shot-peening machine is of horizontal type, fitted with an endless conveyor onto which are placed arbors containing a stack of gears. The arbors rest on rotating disks at each end of the conveyor chain so that the work is in continuous rotation under the two wheels of the machine, assuring the peening of all surfaces. Since the condition of the steel shot or balls used in the process is one of the chief criteria of quality, machine performance is checked hourly by means of the now familiar Almen strip sample. This sample strip, clamped in a standard fixture, is put through the machine hourly, then checked in the Almen gage to measure the established deflection in the strip for each type and size of gear.

The grinding department—Department 14—is another of the general purpose setups, handling the entire gamut of gears and shafts and other parts requiring grinding operations. It contains a full complement of familiar machinery, including a large battery of Heald Size-Matics, Heald

(*Turn to page 92, please*)

Britain Concentrates on Exports

British Combine Photos

IN RESPONSE to the recent request of the British government for an export trade at least 50 per cent greater than before the war, automobile companies in that country are shipping a large part of their current production overseas, most of it going to Australia, South Africa, India and other empire buyers. Automotive exports are expected to be £30,000,000 a year when the 50 per cent increase is reached. About 1000 cars a week is the export target for this year.

Britain's estimated total output for 1946 has been placed at 470,000 private cars, 156,000 load carriers, and 12,000 service vehicles, these figures being considerable higher than those for the peak production year of 1939. The Rootes Group plans to ship cars to 79 countries on orders valued at £7,500,000 and the Nuffield Organization also is reported to have a big volume of orders, including about £1,200,000 volume from India.

In February British factories produced 10,620 cars, 2278 or 21 per cent of which went overseas.

A—Crates of Austin car components at the end of the packing line for shipment overseas.

B—Cars at Morris Motor Car Works ready for export to world's markets.

C—Assembly line at one of the Roots Group's London factories.

A RECENT addition to the Kent-Owens line of milling machines is the new Model 2-20 vertical, manufactured by Kent-Owens Machine Co., 958 Wall St., Toledo 10, Ohio.

Its construction is characterized by simplicity, with the bed, column and head all sturdy case members. A heavy table is guided by dove tail slideways directly cast to the bed.

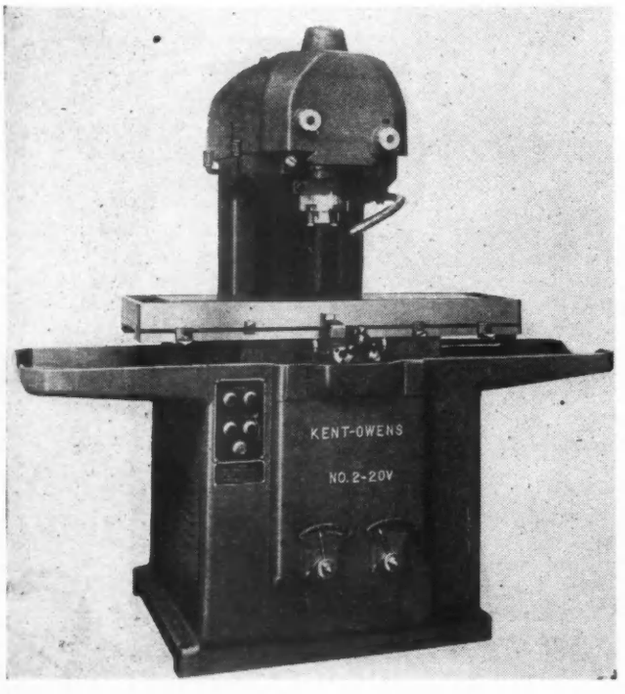
The table is 42 in. long by 12 in. wide with a 20 in. travel, having a fully automatic cycle. It can be fed or rapid traversed in either direction, automatically shifted from rapid traverse in either direction, and automatically reversed at both ends of the stroke. It may also be automatically stopped at any desired point in its travel.

An unusual feature of this machine permits independent adjustment of the feed rate for opposite directions of table travel. This makes possible milling a part at one end of the table at a slow feed rate and also setting up an entirely different job at the other end requiring a faster feed rate. Similarly, this independent adjustment permits setting the feed rate exactly the same for both directions of table travel.

The Kent-Owens 2-20 vertical miller has a four-in. micrometer adjustment on the quill. The standard machine has a maximum gap of 10 in. between the nose of the spindle and the table surface. Two other column heights are also available permitting maximum gaps of 12 in. or 14 in.

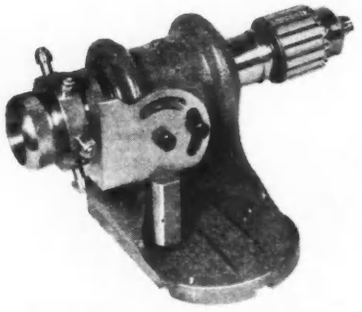
The drive on this machine is simple and direct. Between the standard foot-mounted ball-bearing spindle drive motor and the cutter there are only three gear contacts. The entire drive is mounted on anti-freeze bearings and has automatic lubrication.

A wide range of spindle speeds may be obtained by changing spline mounted pick-off gears contained in the head under a light aluminum cover. These gears have a wide face and run in an oil bath. A medium range of 64 to 860 rpm is furnished as standard equipment—either a low range of 32 to 428 rpm, or a high range of 86 to 1284 rpm can be provided.



Kent-Owens 2-20 vertical miller

AN AXIAL relief-grinding fixture that covers an exceptionally wide range of operations, has recently been added to the line of the Govro-Nelson Co., 1931 Antoinette, Detroit 8, Mich. Especially adapted to grinding cutting edges, steps, flutes and chip relief on milling cutters, burring tools, counterbores, countersinks, end mills, reamers, drills and taps, it is said to perform operations which formerly required a variety of different grinding fixtures.

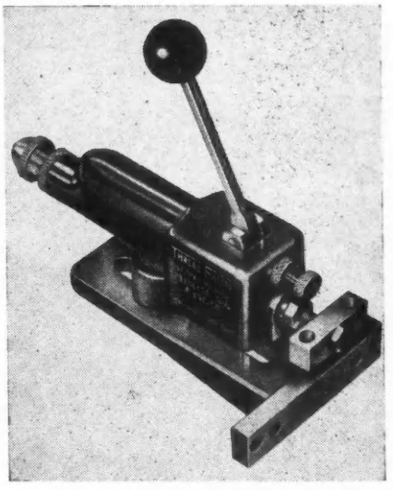


Grovo-Nelson relief-grinding fixture

All adjustments are simple, visual and external, the fixtures being instantly convertible from right to left hand, and vice versa. It can be used on surface grinders as well as cutter grinders, and performs most of the grinding jobs with standard grinding wheels. The axial relief is automatically equalized on all flutes.

THE Lawrenz Thread Faster, made by Peerless Tool & Engineering Co., 1133 N. Kilbourn Ave., Chicago 51, Ill., can be attached to any bench lathe, up to 12-in. swing, equipped with carriage, cross slide and threading facilities. It retracts the tool bit from the work at precisely the same point each time a thread is cut or chased on a lathe. This permits the lathe to be run at top speeds and the use of carbide tipped tools by eliminating the danger of overrunning, tool breakage, and damaging of materials.

The Thread Faster is recommended for production runs not sufficiently large for automatic equipment—on jobs where threads must run up to a shoulder—in all metals, or in plastics.



Lawrenz Thread Faster

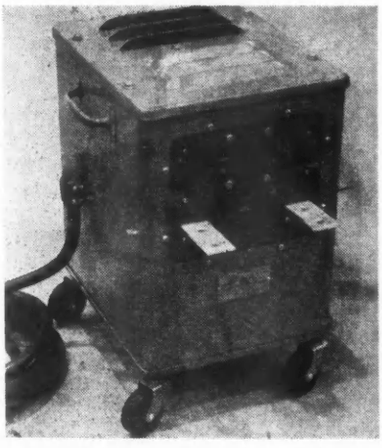
EX-CELL-O Style 20 hydraulic power unit, made by Ex-Cell-O Corp., Detroit, Mich., meets the demand for a compact unit with high spindle speeds and the ability to stand up under fast, continuous operating cycles.

The automatic cycle of this unit makes it possible to build inexpensive high production machines that are suitable for quality work and simple to operate. Such machines consist essentially of plain bases, hydraulic power units and fixtures for the individual work.

New Production and Plant Equipment

The unit is arranged for electrical remote starting and emergency return control. The automatic cycle includes rapid approach, two adjustable rates of feed forward, rapid return and stop. Dwell delay can be provided before the return movement. Adjustable orifices allow a wide range of feed rates. Graduations on the orifice plate facilitate the feed setting.

This compact Ex-Cell-O Unit is especially suitable for drilling, reaming, counterboring and spotfacing operations. It may also be used as a prime mover or driver for other equipment on milling and boring operations. It can be mounted horizontally, vertically with the spindle nose down or at any angle between these positions. The narrow compact design allows mounting units close together or radially around a fixture for simultaneous or successive operations on one or more workpieces.



Westinghouse 10 kva portable brazer

The inbuilt variable delivery hydraulic pump supplies only the volume of oil required for actuating the quill. This results in cooler unit operation because the pump does not raise the temperature of the oil excessively.

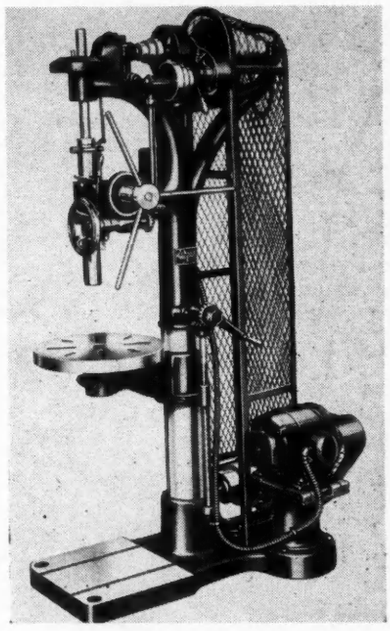
The spindle is driven through a V-belt. From the spindle drive shaft another V-belt drives the hydraulic pump. Changes in spindle speeds are made either by changing the motor pulley or using a different speed drive. Ordinary changes in spindle speed have no effect on the hydraulic performance of the unit except to alter the rate of rapid traverse.

FOR general brazing service in joining copper or copper alloy parts which may be brought together between the jaws of brazing tongs, a new portable 10 kva brazer with air-cooled tongs has been brought out by the Westinghouse Electric Corp., Box 868, Pittsburgh 30, Pa.

The new single phase, 60-cycle unit weighs 100 lb. and is provided with four large caster-type wheels and two handles for quickly moving or carrying any place in the shop or yard. It requires only connection to a 220- or 440-volt source. Alternating current from an adjustable voltage transformer passes through the tongs and parts to be brazed.

The transformer with line contractor is enclosed in a sheet-metal case, and a clamp-type entrance bushing is provided for the incoming primary cable. Built into the front of the brazer, the control panel contains outlets for brazing tong cables, receptacle for foot switch pilot cable, and voltage tap changing plug. The two pronged plug-in switch quickly changes brazing voltage to 12, 10 or 8 volts. A switch for emergizing the contactor control circuit is also provided on the control panel. Cooling of the unit is effected by natural air draft which enters at the bottom, passes over the brazing transformer, and is expelled through louvered openings at the top.

A NEW 20-in. drilling machine has just been announced by the Sibley Machine and Foundry Corp., South Bend 23, Ind. The unit is standard with motor drive and belt guard or, where it is necessary to operate the machine from a line shaft, with tight and loose pulley drive. This machine is especially designed for drilling up to 1¼ in. in cast iron, or the equivalent in other metals. Rotary geared coolant pump and geared tapping attachment also are available.



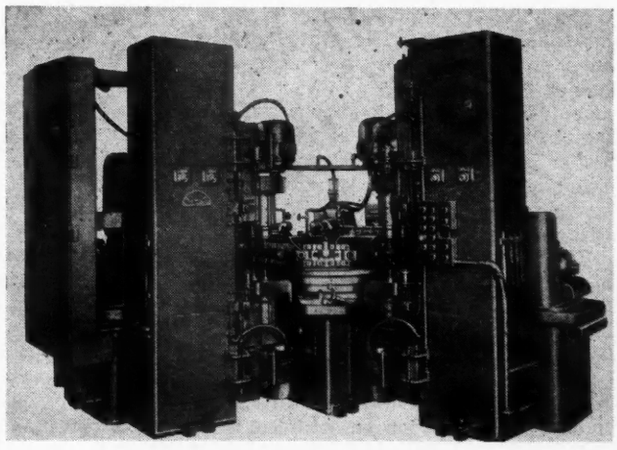
Sibley 20-in. drilling machine

Machined part of the main column is 5¼ in. in diameter. The drill table rotates on an arm which swings on the column to provide maximum working space. Both power and hand feed are furnished. Adjustment is provided for wear between worm and worm gear. On the motor drive unit, the motor is mounted on a pedestal, supported by a rigid base cast integral with the machine. V-belt is adjustable through hinged motor mounting plate.

Features of the new 20 in. drilling machine include wide interchangeability, with all parts tooled for accuracy of fit. Spindle quills are furnished with bronze oil-grooved bushings, and the Morse taper is bored in the spindle after assembly is complete. Heavy-duty ball thrust bearings are provided.

Machine for Processing Steering Knuckles

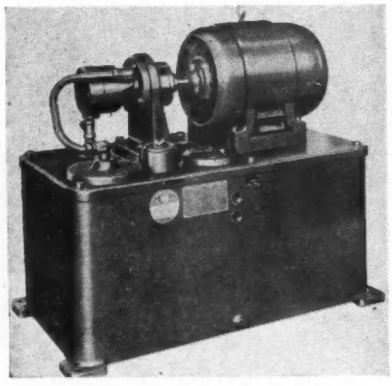
Here is shown a special - purpose machine designed and built by Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich. Operations performed are drilling, reaming, tapping and two-way rough and finished boring. These operations are performed by a series of units arranged around an automatically - operated index table.



By boring the table arm, after assembly, with the same spindle furnished on the machine, table alignment is assured. The table is held at right angle to the spindle within 0.0007 in. in six in.

JOHN S. BARNES CORP., Rockford, Ill., offers two new hydraulic pumping units, Models F-10-A and F-20-A. The Model F-10-A is designed for light duty machine applications, and may be mounted in the machine or on a separate base. It is furnished complete with gear pump, overload valve, motor coupling, pressure gauge, and miscellaneous parts (but less motor). Pipe connections to pump, overload valve, and gauge are also included as part of the unit.

The F-20-A unit is suitable for jobs that require 2 hp and 5 hp. A Barnes Roto-Blade pump which is direct driven



Barnes F-20-A hydraulic unit

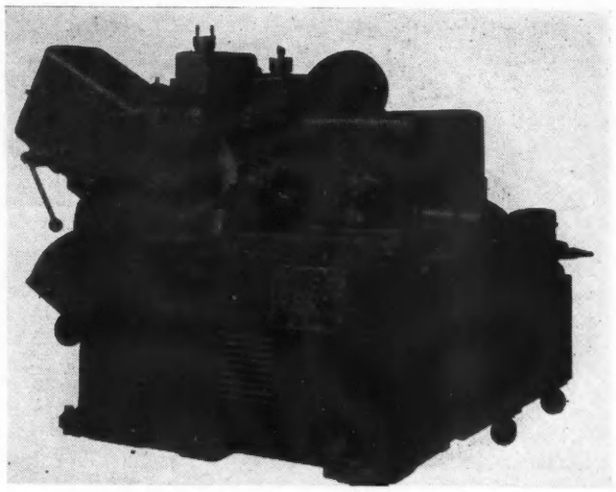
by the motor, develops the fluid power. Pressure is limited by a Barnes hydraulically balanced relief valve. In addition to the tank, pump, and relief valve, the unit also includes motor coupling, pressure gauge, and miscellaneous parts (but less motor).

EX-CELL-O CORP., Detroit, Mich., has developed a high-speed, high-cycle, motorized grinding spindle for use on new machines or on present equipment. It is made in two models, one operating at 25,000 rpm—the other at 65,000 rpm.

The Ex-Cell-O high speed, high cycle spindle is used with a frequency converter, and is adaptable to most small internal grinders. The stator of the one hp, inbuilt motor is contained in the spindle housing and the rotor is mounted on the spindle shaft, eliminating the need for a drive coupling. The motor is balanced both statically and dynamically. This type of drive allows heavier cuts and faster stock removal with better finish.

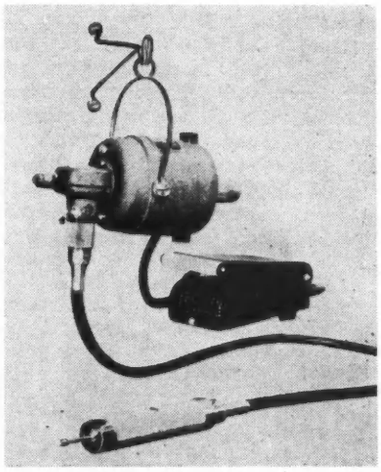
The spintle shaft of the Ex-Cell-O high speed, high cycle spindle is supported on Ex-Cell-O precision ball bearings with minimum end and radial play. Grinding wheels or pencil wheels can be mounted directly on the spindle shaft, or interchangeable quills or in collet chucks. Solid projection spindles, with which the wheels are mounted directly on the spindle shaft, are best suited to production runs on a limited range of hole sizes.

The spindles are designed for operation on 256 volt, 420 cycle, 3 phase current taken from 220 volt, 60 cycle; 3 phase or 440 volt, 60 cycle 3 phase lines. The frequency converter and control panel may be ordered with the spindle.



Landis universal centerless thread grinder

A PORTABLE flexible shaft utility tool capable of getting into small corners and tight places, is now in production at the Dumore Company, Racine, Wis. Weighing but 8 lb, its portability stems from the fact that the 1/15 hp motor needs only to be hung on any convenient hook, connected to an outlet, and it's ready to operate. This makes it an "on the job tool" wherever normal electric current is available.



Dumore flexible shaft utility tool

This Dumore flexible shaft utility tool is equipped with a No. 0 balanced Jacobs chuck to handle all drills, grinding wheels, buffers, and countersink bits with shanks of ⅛ in. diameters or less. The shaft is 36½ in. long, and normal speed for the handpiece is 500 to 3000 rpm, at gear reduction end. If desired, power may be taken off the other end of the motor for direct drive speeds of from 3000 to 10,000 rpm. Speed is controlled by a foot rheostat.

LANDIS MACHINE CO., Waynesboro, Pa., is producing a new universal centerless thread grinder for grinding screw threads on straight cylindrical workpieces as well as on headed or multiple-diameter parts. The machine incorporates all of the necessary mechanisms and controls for grinding by either the "thrufeed method" or "infeed method," it being necessary only to apply the proper tooling for any specific operation.

Single diameter work pieces such as set screws, long rods, and rings are thread ground by passing the work pieces in a continuous flow between the grinding and regulating wheels. This method of grinding screw threads on the centerless thread grinder is known as the "Thrufeed Method" and can be used to grind threads from either solid blanks or to finish threads pre-cut prior to centerless thread grinding.

Headed or shouldered work pieces such as capscrews, headed adjusting screws, stripper bolts and similar multiple diameter parts are centerless thread ground by the "Infeed Method." This type of operation completes the entire thread in approximately one and one half revolutions of the work piece. The work pieces are placed between the wheels one at a time and are automatically ejected at the completion of thread grinding operation. This method of grinding may be used for grinding either pre-cut threads or from the solid, and is frequently used when the threads must be concentric with an unthread portion of the workpiece.

The thrufeed and infeed workrests are adjustable for any helix angle within the range of the machine. A convenient means, including a master gage, is provided for quick an accurate adjustments. The side guides for aligning the workpieces with the grinding and control wheels are attached directly to the work support blade.

An automatic hopper is available for

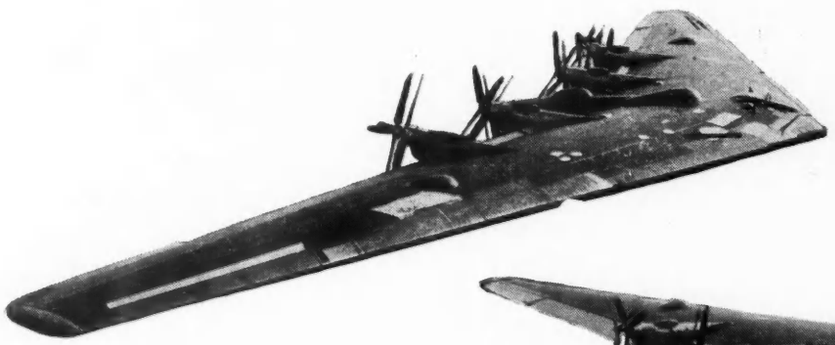
(*Turn to page* 85, *please*)

Northrop XB-35 Flying Wing

THE configuration of the giant flying wing, built by Northrop Aircraft, Inc., is only one of the unusual features of the XB-35 soon to be flight tested at Muroc Army Air Field, Calif. Its four pusher-type, wholly-submerged, aircooled power plants are interesting developments in engine and supercharger installation. The openings in the leading edge of the wing near the center are air inlets to the "plenum chambers" which are the source of air supply for the turbosuperchargers, intercoolers, oil coolers, and engine cooling. The engines are Pratt and Whitney Wasp Majors, one pair of R-4360-17 and one pair of R-4360-21 series. Two General Electric single-stage turbosuperchargers are used with each engine. The engines drive four eight-bladed, Hamilton Standard, counter-rotating propellers which have the reversible pitch feature and are 15 ft 4 in. in diameter.

"Elevons" on trailing edges of the Wing, perform the function of elevators and ailerons; the span of each is 34.5 ft. Double split-flaps, which open like a clamshell, form the trim flaps at the trailing edge near the wing tips. When the pilot presses left rudder, the double flap opens at the left tip setting up a drag which slows the wing at that end and turns the giant plane. Use of this flap rudder has enabled engineers to dispense with vertical surfaces such as those used on conventional aircraft. Landing flaps occupy the center section of the trailing edge and measure approximately 29 by 6 ft. Controls are actuated by a booster hydraulic sys-

(*Turn to page* 62, *please*)



(Above) Front view of the giant flying wing showing its sweepback. Slots near the leading edge at the wing tips have automatic doors which close over them when the plane is operating at high speed.

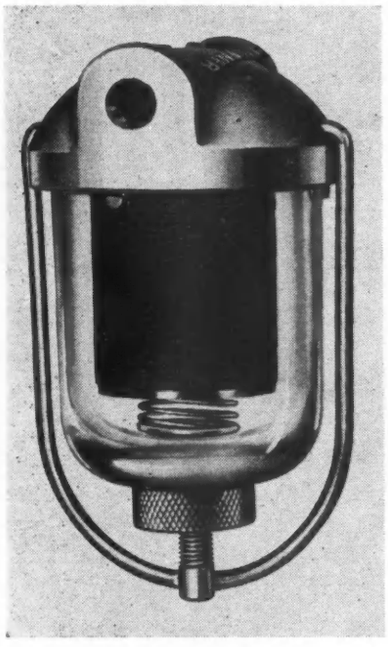
(Above) XB-35 Northrop Flying Wing long-range bomber showing its unusual configuration. Note the propeller on the left outboard engine. It was installed temporarily and will be replaced by the eight-bladed model before flight test.

(Left) Close-up of the XB-35 nose showing the pilot's bubble canopy and to the left the windows where the copilot and bombardier are stationed.

Improved Gasoline Purifier

An advance in automotive design resulting from wartime research, the Skinner Gasoline Purifier, has just been released for civilian use by the manufacturers, Skinner Purifiers, Inc., Detroit 11, Mich. It is made in one model to fit almost all applications—cars, trucks, buses, tractors, stationary engines and fuel oil burners.

The Skinner Purifier purifies gasoline or other fuel by passing it between layers of helically wound ribbons made from impervious material. Dirt and other impurities are stopped at the outer edges of these ribbons and fall into the sediment chamber. Any accumulation on the outer surface of the cylinder of helically wound ribbons occurring after long use can be quickly cleaned off by blowing compressed air,



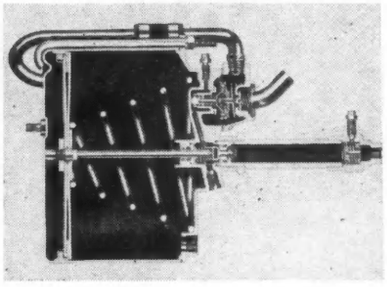
Skinner Gasoline Purifier

or even the breath, into the cylinder. The cylindrical element is known as the "Skinner Kwick Klean Kartridge."

The Skinner Purifier separates free water from gasoline. This phenomenon can be attributed to the laminated construction of the "Kwick Klean Kartridge" with its almost innumerable orifices of a few microns in size, and the differences in surface tension and specific gravity of the two liquids.

New Model Bendix Hydrovac

A new model of the Bendix Hydrovac, vacuum-hydraulic power braking unit, has been announced by Bendix Products Division of Bendix Aviation Corp., South Bend 20, Ind. Designated as Model C Hydrovac, the new design



Internal construction of model C Bendix Hydrovac

is available to the service field in six sizes suitable for vehicles ranging from light panel trucks to the largest tandem axle truck and tractor-trailer combinations.

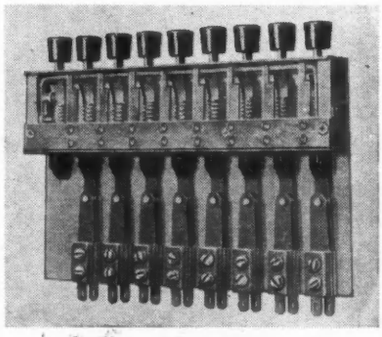
With the new Hydrovac line, a series of installation kits is offered the service trade to facilitate ordering and installing the equipment.

The Model C Hydrovac is the same in working principles as previous models. Changes have been principally refinements of details and simplification. Many of these changes facilitate reconditioning and maintenance operations in the field.

In line with past practice, the vacuum power element is of the cylinder and piston type. On the smaller models, a single-piston cylinder is used; larger models have two vacuum pistons, both mounted upon the same piston rod. This results in twice the power without increasing the diameter of the unit; and thus facilitates installation where limited space is a factor.

Nine-Position Switch

General Control Co., 1200 Soldiers Field Rd., Boston 34, Mass., has brought out the new "Master" Model MPB, a nine-position push button switch made in both locking and non-locking frame types. The locking frame type has eight positions and one reset position. In this type, any switching combination which has been set can be released by one operation of the reset button. All parts are made of non-corrosive materials. The contacts are fine silver, permanently riveted to the phosphor-bronze contact springs.

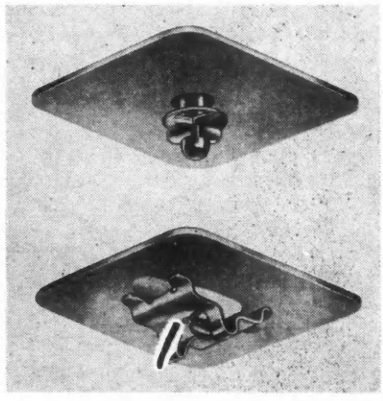


Master model MPB switch

The rating of the "Master" Model MPB switch is 5-10 amp, 125 volts, 60 cycle alternating current (non-inductive load). It is especially designed for use on electronic and communications equipment.

Quick-Operating Fastener

A simplified, light duty quick-operating fastener designed for use on removable and hinged panels wherever accessibility for inspection, oiling, adjusting, cleaning or servicing is required, is now being introduced by Shakeproof, Inc., 2501 N. Keeler Ave., Chicago 39, Ill.



Shakeproof Q-Two fastener

Known as the Shakeproof Q-Two, this fastener is said to be so simple to install that installation costs are held to a minimum. It consists of three parts; a stud which is held onto the outer sheet by a special spring washer and a receptacle which is easily snapped onto dimpled inner sheets or frames.

Other features include allowance for variations in sheet alignment up to ⅛ in., compensation for variations in sheet thicknesses, elimination of rivets and screws, and positive locking with one-quarter turn.

New Type Roller Bearing

SKF Industries, Inc., Front and Erie Ave., Philadelphia, Pa., has brought out a new type roller bearing for carrying heavy loads at high speeds. The new development, known as a spherical roller thrust bearing, is said to solve the difficult problem of combining in a single bearing the triple features of high-load capacity, speed and low temperature.

The new-type spherical roller thrust bearing is expected to facilitate wind tunnel operation for research into such

New Products

aeronautical projects as gas turbine and jet propulsion speeds and designs. It will also ease maintenance and operating problems on large vertical water pumps, electric generators and other high-speed machines.

Other applications of the new development are as thrust blocks on marine propeller shafts, on roll necks in steel and aluminum rolling mills, and as thrust mountings for railroad turntables, water turbines, water wheels, oil well swivels, dredge pumps, extrusion machinery for plastics and rubber, and various types of gear drives.

SKF spherical roller thrust bearing

The bearing's self-aligning principle which compensates for shaft deflections, distortions or weaves is said to permit heavy loads to be distributed evenly over all rollers and eliminate danger of overloading. Because of its compactness, it utilizes less space and is lighter in weight than a plain bearing.

SKF production facilities have been tooled to develop preferred sizes for immediate manufacture.

Ability of the new bearing to carry heavy loads at high speeds is possible because of unique design which permits more effective lubrication. Another feature of the bearing is a cage retaining sleeve pressed into the bore of the inner ring, making a contained assembly of the rollers, cage and inner ring.

Lightweight Thermal and Acoustical Insulation

An extremely lightweight, non-combustible Fiberglas thermal and acoustical insulation material is a recent development of Owens-Corning Fiberglas Corp., Toledo, Ohio, for installation in civilian aircraft, buses, trucks, railroad cars and other applications where light weight is of major importance.

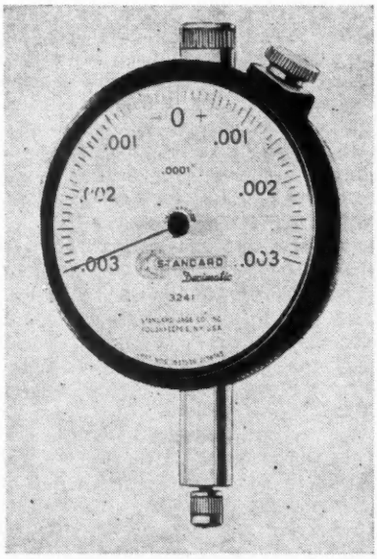
The material is identified as Fiberglas Superfine PF insulation. It is composed of glass fibers, with an average diameter of 0.00005 in., which are treated with a thermosetting binder and shaped into resilient, flexible, half-inch-thick sheets. Sheets are available in 48 and 54 in widths. Density is 0.6 lb per cu ft. Approximate weight of the sheets per sq ft is 0.025 lb. Length of a roll is 50 ft.

Standard Gage Introduces Decimatic Indicators

For fine tolerance checking, the Decimatic series of indicators has been introduced by the Standard Gage Co., Inc., Poughkeepsie, N. Y. These indicators are characterized by having dial markings in decimals, directly comparable to blueprint tolerances.

Working advantages include the modified range, from approximately "20 minutes of" to "20 minutes past" on the dial. This range, while adequate for all but coarse tolerance checking, elminates the possibility of failure to notice a complete revolution of the hand. Also, these instruments are free from noticeable whip and waver of the hand.

Consistent repeatability of a high order and especially good accuracy are claimed by the manufacturer for these indicators. The instruments operate under exceptionally low tension.



Standard Gage Decimatic indicator

Mounting dimensions are in accordance with American Gage Design standards and consequently Decimatic models may be used in fixtures made to receive AGD indicators. The Decimatics depart from AGD specifications only in range and in the manner of marking the dial.

The Decimatic series of indicators comprises 19 different models with a variety of graduation values in both English and metric units.

Carbide Lathe File

A light weight cemented carbide file for filing bronze, brass and hardened steels is now being marketed by the distributors for products of Henry Disston & Sons, Inc., of Philadelphia, Pa. The filing surface of the tool is a carbide insert supplied by Carboloy Company, Inc., of Detroit, Mich. The insert is 4 in. long by ¾ in. wide and is single cut with 34 teeth per in. on the same angle as standard mill files. At present, the file is being supplied in one shape and size and in one cut.

The carbide insert is in one piece. When one face of the insert becomes worn, the carbide insert can be turned over and the opposite face used, doubling the life of the tool. The holder is of aluminum.

Disston file with carboloy cemented carbide insert

The new tool has been designed primarily for deburring or chamfering hardened steels which must be operated at speeds of 450 feet per minute on lathes both engine and turret. It cannot be used for the hand filing of metal. However, it may be used on molded plastics for hand filing of flat or convex surfaces on which it produces a smooth finish and will not clog.

Hydraulic Controls for Rear Engine Vehicles

A hydraulic system of operating throttle and clutch on vehicles with the engine mounted in the rear has been engineered, tested, and is now manufactured by the Bendix Products Division, Bendix Aviation Corp., South Bend, Ind.

At the present time, equipment for rear engine mounted buses is in production; and special consideration is being given to installations for the proposed "Tilt Cab" under floor engine truck designs. Similar controls for all types of vehicles are, of course, entirely feasible. As installed and operated, the same underlying principles used in actuating the Bendix hydraulic brake have been adapted to clutch and

throttle controls, and with a minimum of working parts.

Generally speaking, a fluid reservoir, a master control cylinder mounted beneath the floor boards, a slave cylinder and a connecting hydraulic line make up the complete installation. The master cylinder is connected to the conventional accelerator pedal or throttle. The slave cylinder is connected directly to the throttle lever on the carburetor and pressure exerted on the foot pedal opens the carburetor throttle as in the conventional manner.

The Bendix hydraulic clutch control works on the same principle. The equipment consists of a fluid reservoir, a master cylinder connected to the clutch pedal, a slave cylinder, and a connecting hydraulic line. The slave cylinder may be mounted on the engine, the clutch housing, or on the transmission housing, with an adjustable rod connecting the slave cylinder piston rod to the clutch operation lever. Pressure on the clutch pedal causes the clutch mechanism to operate in the conventional manner.

Electric Remote Tension and Weight Indicator

W. C. Dillon & Co., Inc., 5410 W. Harrison St., Chicago, Ill., are introducing a combination of the Dillon dynamometer and highly-responsive, self-synchronous motors. With this new Ten-O-Trol, repeater stations may be

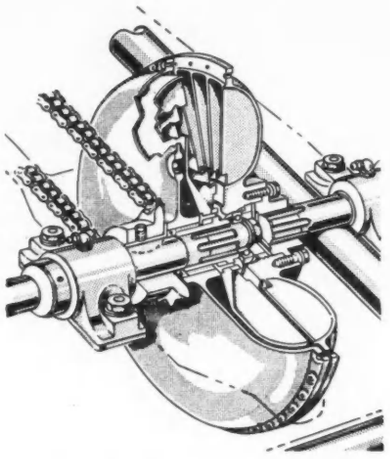
Tens-O-Trol dynamometer

as much as 300 ft from the actual measuring dynamometer. Cable between transmitter and first repeater can be furnished in even multiples of 50-100 or 200-ft lengths. Cable between first and second repeater stations is 25 ft long. Battery cable is 25 ft long. All cables have aircraft-type sockets.

The pressure beam on the Dillon Tens-O-Trol requires a deflection of only 0.040 in. to render a full-scale 360-deg reading.

Fluid Drive Coupling

A fluid drive coupling that is adaptable to a number of applications is now in production by the Toolcraft Manu-



Firebaugh fluid drive coupling

facturing Co., Huntington Park, Cal.

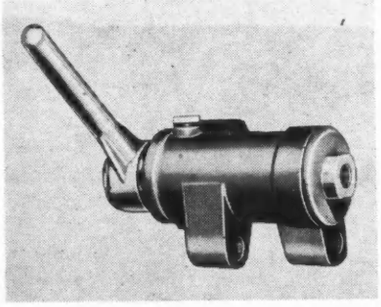
This hydraulic oil coupling, which operates on the Vulcan-Sinclair principle, eliminates the necessity for both a transmission and differential mechanism. The unit is self-contained and consists of three basic parts. It can be installed directly on the shaft of any engine or electric motor.

In general industry it has a wide variety of uses—for cranes, refrigeration units, hoists, winches, conveyor systems, packaging machines, and wherever smooth starting and stopping of power-driven equipment is necessary. Because this fluid drive coupling is completely enclosed it prevents the entrance of dirt and dust.

Hand Control Valve for Air Brake Systems

The Wagner full-metering hand-control valve was designed by Wagner Electric Corp., 6400 Plymouth Ave., St. Louis 14, Mo., specifically as a single-barreled, hand-control unit — not an adaptation of another type of valve to hand control use. Its compact design facilitates installation on dash, steering column, or other convenient location. Serrated handle of valve adjusts to any position desired by driver. Handle reaction and movement provide driver with a distinct "brake feel."

The inherent qualities of this valve make it possible to apply, release, or hold any desired amount of air pressure in the application side of the system. The driver is thereby able to regulate the degree of deceleration—from a slow, smooth stop, which requires very little air pressure, to an emergency application which is accomplished by a full stroke of the application handle thereby admitting reservoir air pressure to the system.



Wagner hand-control metering valve

Utilized primarily for independent control of the trailer brakes in dual braking systems, its advantages are said to make the valve ideal for manual control of air-actuated units on commercial and industrial equipment.

Simple Coupling for Flexible Tubing

A simple coupling which is said to make possible a "10-second" joining and disconnecting of individual sections of flexible tubing has been developed for Spiratube, the non-collapsible, retractable tubing manufactured by the Warner Brothers Co., Spiratube Division, Bridgeport 1, Conn.

The Warner coupling is built into the tubing, eliminating the need of fittings. The coupling, a flat spring steel collar, may be compressed to slip inside the end of another section and then released to form a strong, tight joint. The sections are disconnected by compressing the inner spring steel collar and withdrawing the male end.

Warner built-in coupling for flexible tubing

Warner couplings, like the rest of the tubing, are covered with long-fibre duck fabric, which has been processed fire-resistant and coated with a tough, durable thermoplastic. There is no exposed metal inside or out, which makes Spiratube safe in the presence of explosive or inflammable materials. It eliminates sparking hazards.

Spiratube is furnished in standard diameters from 3 in. to 16 in. and in lengths of 10, 15 and 25 ft.

Luminescent Lucite Sheeting

New forms of "Lucite" acrylic resin containing luminescent pigments—a fluorescent type which glows when exposed to ultraviolet, or "black" light, and a phosphorescent type which glows in the dark after exposure to ordinary light—have been developed by the Plastics Department of the Du Pont Co.

Indicating a promising future on highways, airlanes and sea lanes, the company said the phosphorescent "Lu-

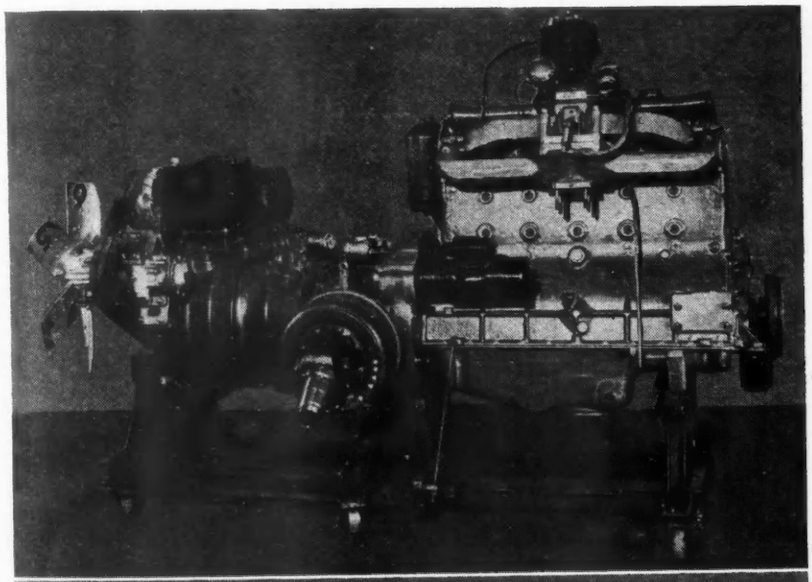
(*Turn to page 67, please*)

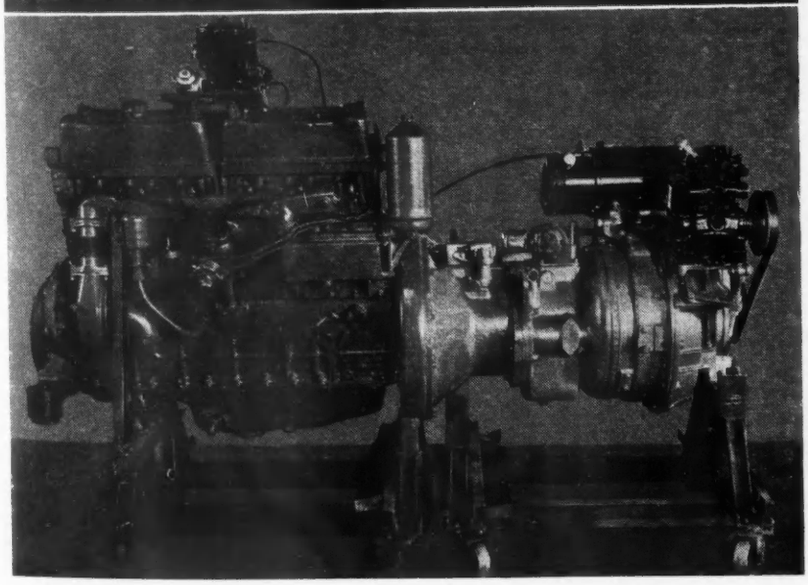
Aerocoach's *New 210 hp* Bus Engine

GENERAL AMERICAN AEROCOACH CO. recently announced an engine of its own design and manufacture for its largest size motor coach, Model P-46-41. International RED-450 engine is being continued in Model P-45-37. An unusual feature of the new engine is that there are no fan belts, water hoses, or outside oil lines on it. As can be seen in the illustrations, the fan and other belt drives are located at the end of the transmission, which is a Spicer hydraulic torque converter.

The engine is a six cylinder, four-stroke cycle, valve-in-head design with a bore and stroke 4¾ in. by 5⅜ in., a piston displacement of 572 cu in., and a compression ratio of 6.75 to 1. Full load power of 210 hp is attained at a governed speed of 2500 rpm with a maximum torque peak of 500 lb-ft occurring at 1400 rpm. This, according to Aerocoach engineers, gives maximum efficiency with the hydraulic torque converter. Spark timing is specified as nine deg BTDC with 80 octane fuel. The oil system has a capacity of 26 qt, including the twin filters which are base mounted, and a heat exchanger that is built into the system. An inspection hole and cover plate is provided on the oil pan. The main bearings are Moraine, replaceable shell type with a thickness of 0.1232 to 0.1235 in. and specified clearance limits of 0.0025 to 0.0035 in. There are seven main bearings. Connecting rod bearings are the same type and are 0.100 in. thick with recommended clearance 0.0012 to 0.0036 in. The crankshaft is Toco hardened, the bearing journals being 3¼ in. at the mains and 3 in. for the connecting rod locations.

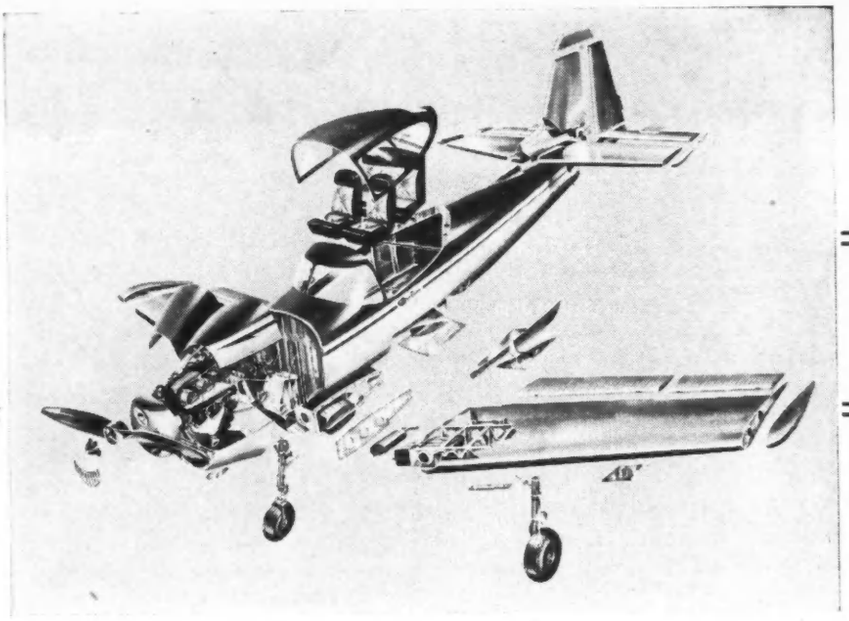
Cylinder bores are hardened dry liners. The aluminum alloy pistons have five rings, of which the upper three are taper faced and the lower two are slotted. The skirt to bore clearance is 0.005 in. The connecting rods measure 10½ in. center to center and have 1.5004 ID, 1.752 OD by 1.750 long bronze pin bushings. Intake valves made of NE 8744, are 6 33/64 in. long with a head of 2 9/64 in. diam and 30 deg seat; exhaust valves 6 9/64 in. long with 1 57/64 in. diam, 45 deg heads are made of T. A. steel (Roto). Manifolding is of the individual port type, and the carburetion is 1¾ duplex downdraft. The valve timing opens the inlet 17 deg BTDC and closes 57 deg ABDC; exhaust opens 55 deg BBDC and closes 15 deg ATDC.





(Top)—Drive side of Aerocoach powerplant

(Left)—Aerocoach 210 hp engine with Spicer torque converter.



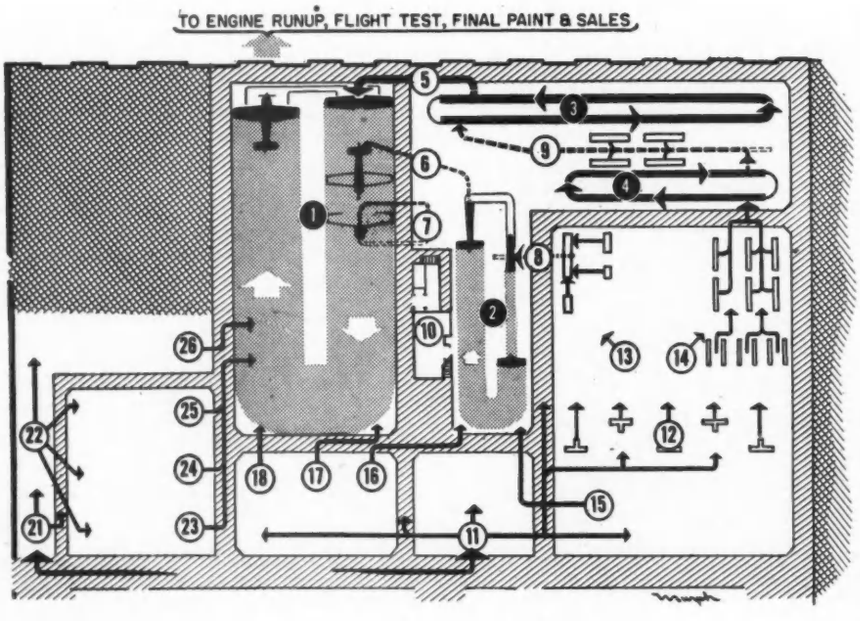
Assembly breakdown of North American's Navion.

Navion Production

NORTH AMERICAN AVIATION, INC., has installed a mechanized system for assembly of its new four-passenger personal airplane, the Navion, announced in AUTOMOTIVE AND AVIATION INDUSTRIES, April 15, on page 40. The first production Navions began to roll off the final assembly line in May.

J. H. Kindelberger, president and general manager, states that initial production has been scheduled in blocks of 250 airplanes each, and by July the new assembly lines will be turning out Navions at the rate of ten a day. The illustration shows the assembly breakdown for the production of the new all-metal 185 hp plane. The company plans to use three almost totally conveyorized assembly lines—one for the wings, one for the fuselage, and the third for final assembly —which will provide an almost continuous production line. Detail parts for the Navion will be manufactured in a separate building.

Tests for CAA certification of the airplane are to be completed in July, and first deliveries are planned for late that month.



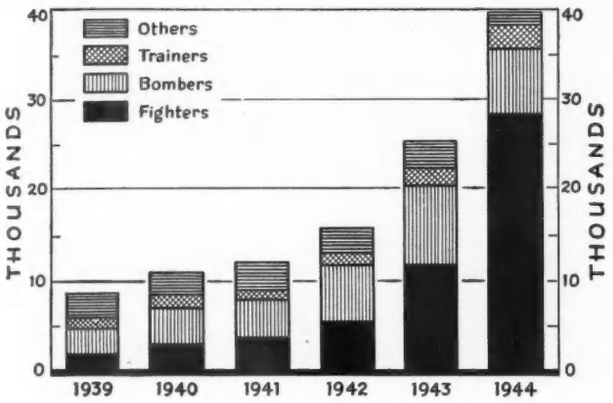
Flow chart of Navion airplane production layout in one section of the North American plant at Los Angeles Municipal Airport.

1. Final Assembly Conveyor Line.
2. Fuselage Conveyor Line.
3. Wing Conveyor Line.
4. Wing Leading and Trailing Edge Conveyor Line.
5. Wing Delivery and Turnover Craneway.
6. Fuselage Delivery and Mating Monorail.
7. Engine Delivery and Installation Monorail.
8. Monorail-Fuselage from Master Jig to Conveyor Line.
9. Monorail-Wing from Setup to Master Jigs to Conveyor Line.
10. Tool Crib, General Foreman's Office.
11. Sheet Metal Detail Parts Receiving.
12. Erco Riveting Machines.
13. Fuselage Sub Assembly.
14. Wing Sub Assembly.
15. Empennage Assembly.
16. Engine Mount Assembly.
17. Cowling Assembly.
18. Canopy Assembly.
21. Machine Parts Receiving.
22. Parts Storage.
23. Tubing.
24. Hydraulics.
25. Electrical.
26. Sewing and Upholstery.

GERMAN PRODUCTION

AIRCRAFT

German Aircraft Production by Types



Fighters Were 73% of Aircraft Production in 1944

Year	Fighters	Bombers	Transports	Trainers	Others	Total
1939	1,856	2,877	1,037	1,112	1,413	8,295
1940	3,106	3,997	763	1,328	1,632	10,826
1941	3,732	4,350	969	889	1,836	11,776
1942	5,213	6,539	1,265	1,170	1,369	15,556
1943	11,738	8,589	2,033	2,076	1,091	25,527
1944	28,926	6,468	1,002	3,063	348	39,807

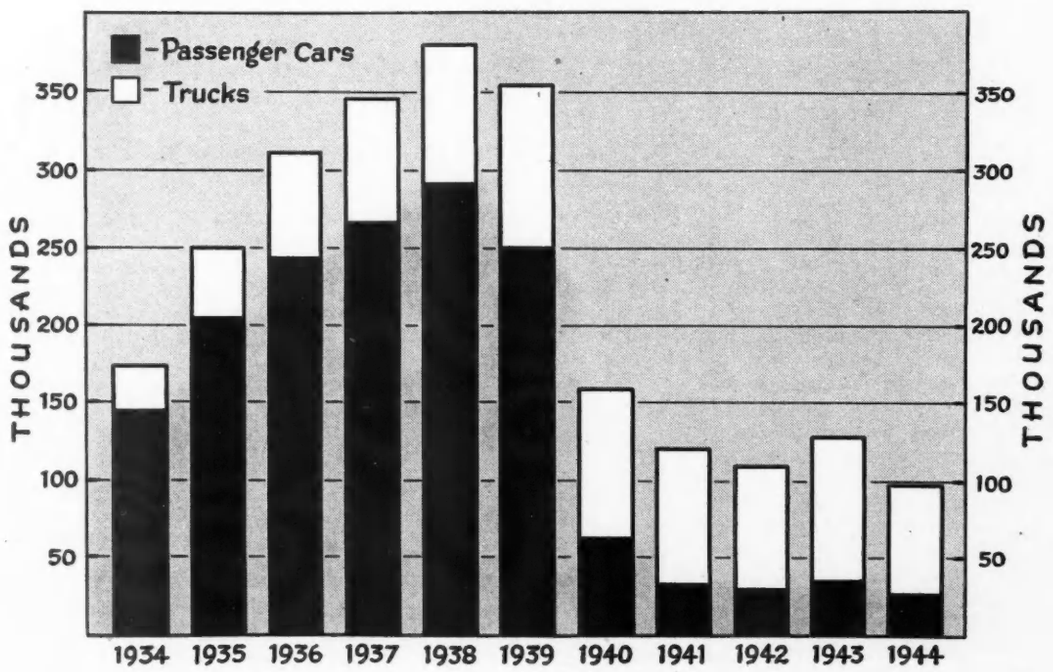
Airframe Weight of Aircraft

(In Metric Tons)

	Fighters	Bombers	Transports, Trainers and Others	Total
1941	12,503	43,832	10,811	67,146
1942	17,065	65,182	13,527	95,774
1943	39,750	82,440	19,420	141,610
1944	93,326	69,089	12,523	174,938

MOTOR VEHICLES

GERMAN CAR AND TRUCK PRODUCTION BY YEARS



Trucks

	Number Produced	Per Cent of Production for Armed Forces	Civilian Economy	Export
1934	28,452	6.2	85.9	7.9
1935	45,213	15.6	75.3	9.1
1936	70,040	10.4	80.1	9.5
1937	79,126	16.1	66.1	17.8
1938	87,661	26.0	58.3	15.7
1939	101,745	32.0	52.0	16.0
1940	87,888	60.7	24.6	14.7
1941	86,147	59.3	25.2	15.5
1942	80,512	72.1	21.2	6.7
1943	92,959	79.8	15.9	4.3
1944	77,177	87.3	9.8	2.9

Passenger Cars

	Number Produced	Per Cent of Production for Armed Forces	Civilian Economy	Export
1934	144,542	2.7	89.6	7.7
1935	205,233	4.5	85.7	9.8
1936	240,530	3.9	83.7	12.4
1937	267,910	2.1	76.3	21.6
1938	289,108	4.7	73.1	22.2
1939	250,788	8.0	66.7	25.3
1940	67,561	42.2	38.5	19.3
1941	35,165	77.0	9.1	13.9
1942	27,895	87.3	4.6	8.1
1943	34,478	94.9	2.9	2.2
1944	21,656	97.1	2.5	0.4

NEWS *of the* Industry

Supply Shortage Checks Car Production . . . Progress will be Slow for Many Weeks . . . Total Output Far Below Goal . . . Seller's Market May End in 1947

The rise and dip of weekly automobile production figures over the past month is an accurate reflection of the chaotic supply picture which is holding output of automotive products to less than half of what it should be at this stage of reconversion. Practically all of the difficulty tormenting the industry today is the direct result of labor trouble in the supplying industries, including those indirectly involved, such as coal and transportation.

After a slow but fairly consistent upward trend, with one or two minor setbacks, production dropped 20,000 units during the week ending May 18. Chrysler assembly lines were down all week, Ford operated only three days and then shut down for an indefinite period, perhaps 30 days, Willys, Pontiac, and Nash worked only four days. Buick and Oldsmobile managed to string the week out, but were unable to resume at the first of the following week. The answer is the same at all companies—strikes in suppliers' plants. Production for the week was just short of 50,000. During the corresponding week of 1941, output was 127,255 vehicles, illustrating just how far the industry yet has to go before it will be anywhere near normal operations.

Industry Keeps Going Despite Handicaps

In spite of all the obstacles placed in its road, the automotive industry manages to keep some cars rolling off the lines, and expects to weather the present unhappy days and go on to new production heights. The belief now is that progress will continue to be slow for many weeks. The unsettled labor picture generally will continue, at least for the forseeable immediate future. Also, there is some opinion in Detroit now that with a rising price level very much in evidence, a new wave of wage increase demands may crop out late this year, leading to a new series of wage-price crises. Whether this will develop into a recurrence of the strike and strike-threat days of early 1946 or will be worked out on an increased wage-increased price basis still is not known. Certainly the experience so far has shown the fallacy of the government's position that pay hikes do not necessarily mean price increases. Automobile prices were boosted first to allow for pay boosts and now are being upped again to account for higher material prices, which in turn were brought about by higher wages wrung from suppliers. There no longer is any doubt that OPA's goal of little or no increase over 1942 price levels for automobiles has been effectively scuttled by the intemperate demands of labor and by the government's own unrealistic wage policy.

Production This Year Will Miss Goal

Even when the pessimism prevailing currently in the automotive industry is discounted somewhat, there is no cause for cheering over the possibilities of hitting the three million car goal predicted early this year. The total production of cars and trucks for the first half of 1946 has been estimated at about 750,000 units. To meet the three million goal this year, the industry would have to build at the rate of 86,000 cars a week for the last half of 1946. Actually the prospects of reaching this level are remote for several weeks, according to industry spokesmen. The experience thus far has been that when a certain production plateau is reached the supply of parts puts a brake on further advance, at least for a time. The effects of the coal strike still are unknown, but it is felt that it may result in hampering production for several weeks. The reason is that coal mined under the truce has been allocated to essential uses and with stockpiles reduced by the prolonged period of non-production, adequate stocks for steel mills and other industrial uses may not be available.

Ferguson Bendix President; Breech Goes to Ford

Malcolm P. Ferguson of South Bend, Ind., was elected president of Bendix Aviation Corp. to succeed Ernest R. Breech, who has resigned, effective June 30, to become executive vice president and a director of the Ford Motor Co., it was announced following a meeting of the Bendix board of directors.

Mr. Ferguson has been a director and vice-president of Bendix, and group executive in charge of its divisions producing automotive equipment, as well as fuel injection carburetors, direct fuel injection systems and struts and brakes for aircraft.

Mr. Breech has been president of Bendix since February 1942, and a director and a member of the executive committee since 1937. He will remain a director of Bendix during the balance of this year.

Booming Automobile Market May Be Short Lived

In spite of present difficulties in getting delivery on new cars, a spirit of caution has been developing in the automobile industry toward the assumption that a seller's market is assured for the next two or three years. In the past several months, sales managers have been dropping overt hints that perhaps the milk-and-honey prospects have been a bit overdone. It remained, however, for Lyman W. Slack, sales manager of Packard, to come out bluntly with the assertion that the present seller's market could do a rapid flip-flop to a competitive market, possibly by the first of next year. He said that intense competition from other industries for the consumer's dollar would be the principal reason for the reversal. Other spokesmen have made the same point in less specific terms. As far back as last fall, a Chrysler official explained that the reason his company was not going heels over head into expansion was that it did not feel certain the market possibilities then being expounded so widely actually existed. Chrysler policy, he said, was to wait and see, but to be ready for any eventuality. One thing that may bring about a competitive market is the rising cost of automobiles. With recent wage increases and increased material costs pushing prices far above 1942 levels, and further boosts sure to come if labor comes through with more wage demands, a buyer's strike is not improbable, according to one company spokesman. The absence of a real low price field today probably is one of the major reasons for the plans announced by Ford and Chevrolet for a lightweight car priced about where the Ford and Chevrolet used to be. However, if the upward spiral of wages and prices continues, even these cars may be pushed up higher than originally planned.

No Inserts *No Tapping* *No Machining*

For Plastic or Diecast Products with Push-on SPEED NUTS

—THE FASTER SPEED NUT WAY!

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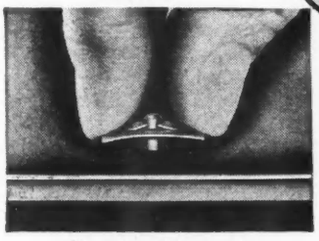
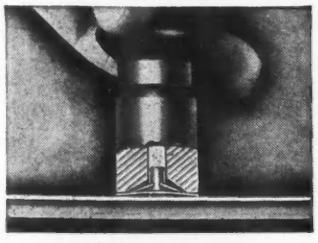
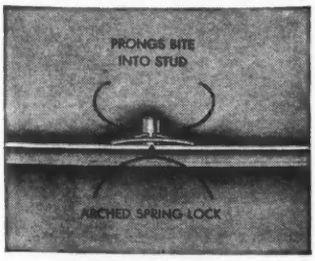


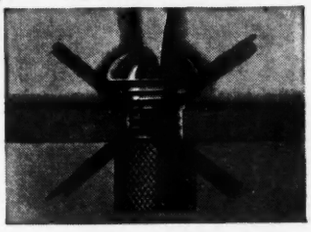
Start Speed Nut with thumb and finger.



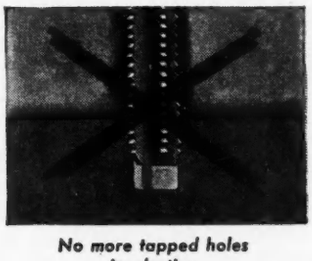
Push down over stud with countersunk tool.



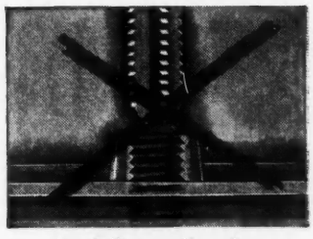
Prongs lock securely.



No more inserts in plastics.



No more tapped holes in plastics.



No drilling and tapping in die castings.

If you assemble plastic or die cast parts, the use of Push-on *Speed Nuts* will enable you to eliminate expensive inserts, tapping and threading operations. Just zipping a Push-on *Speed Nut* over an unthreaded, integrally molded stud will give you a vibration-proof fastening with a spring steel bite that stays put. • Use Push-on *Speed Nuts* for fastening plastic or metal name plates, knobs, handles, trim strips, medallions, dials, bezels, grilles and scores of other parts that must be fastened quickly and inexpensively. Holds equally well over rivets, wires, nails and tubing. • You can do it faster, better and cheaper with a *Speed Nut* or *Speed Clip* Give us your assembly details today and we will send you samples to fit *your job*. A cost analysis doing it the *Speed Nut* way will amaze you.

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PUBLICATIONS AVAILABLE

Publications listed in this department are obtainable by subscribers through the Editorial Department of AUTOMOTIVE AND AVIATION INDUSTRIES. In making requests give title above the item concerning the publication desired, the date of issue in which it appeared, your name and address, company connection and title.

Lead Comparators

Michigan Tool Co. — Bulletin No. 1200-46, Describes and illustrates Models 1200 and 1200A Sine-Line Lead Comparators for checking helices on internal and external helical gears and worms in production. Complete machine specifications for both models and a list of special equipment are included in the bulletin.

Switches

General Control Co.—8-page folder describing and illustrating five models of manually operated switches.

G-E Mycalex

General Electric Co., Chemical Dept. —24-page booklet on Mycalex. The design section of the booklet explains the size range, thicknesses, etc.; preferred shapes, tapped holes, etc. and cutting, drilling, tapping holes, milling and grinding of machined parts.

Plastic Sealing Caps and Sleeves

General Electric Co., Plastics Div.— 4-page folder illustrated by photographs and drawings and containing description of the new plastics compound and its properties, a list of colors and applications, sizes, diameters, prices and ordering directions. An explanation of the new dilator solution used is also included.

Mechanical Rubber Parts

Chicago Belting Co.—Aero-Seal Rubber Products Div.—Brochure on mechanical rubber parts giving in detail the production of mechanical parts from synthetic rubber materials. Describing extrusion and molding of parts, as well as the design of molds, inspection and final trimming of finished parts. A section is devoted to illustrations of typical parts used in mechanisms.

Aluminum Alloys

Aluminum Alloys Corp.—New, fully illustrated catalog describing the Company's complete facilities for production of sand or permanent mold aluminum castings and Ray Day pistons. Included are tables on chemical and physical properties of aluminum alloys and a section on general characteristics and uses of aluminum.

Aviation Fuel Handling Equipment

Bowser, Inc., Aviation Div.—Booklet on aviation fuel handling equipment covering the details of airport pumping systems, refueling systems, dispensing pumps, trucks, miscellaneous equipment, etc. A useful reference guide for airport management is included.

Temperature Calculator

Lincoln Electric Co.—Welding preheat and interpass temperature calculator and an instruction book telling how to use the calculator. A question and answer section is included.

Diesel Nozzle Tester

The Buda Co.—New 4-page bulletin No. 1238 describing Buda's Universal Diesel Nozzle Tester, a product that tests all makes and models of Diesel nozzles and injectors.

Jet Drill and Jet Director

Republic Drill and Tool Co.—Bulletin J-2, describing and illustrating hyperdrilling with Jet Drill and Jet Director. A price list for jet directors is included.

Automatic-Locking Differential

Thornton Tandem Co.—Manual and Service Price List designed to provide a comprehensive description of the construction and operation of the Thornton automatic-lock Differential.

Ampcoloy 90

Ampco Metal, Inc.—Bulletin 81, describing and illustrating Ampcoloy 90. Chemical analysis and physical properties are given.

Aluminum Bronze Alloy

Ampco Metal, Inc., Bulletin 66, The Machining of Ampco Metal. Information contained is based on standard machining practice in the Ampco Machine shop. The bulletin is well illustrated with diagrams and pictures of operations.

Flame Hardening Apparatus

Air Reduction Sales Co.—New catalog describing design and use of Airco flame hardening apparatus. Items covered in the catalog vary from water-cooled torches and tips for hardening small parts to complete apparatus for use on large jobs. It also includes equipment for gear hardening and hardening of both internal and external rounds, as well as flat surface hardening and lists a variety of manifold, regulators, valves and seals.

Chevrolet Dealers Reject Union Demands

Chevrolet dealers in the metropolitan Detroit area have rejected emphatically a demand by the AFL Teamsters union that they sign blanket contracts covering all new and used car salesmen. At a meeting May 15, the dealers decided to do battle on the issue in the face of threats by the union, which controls haulaways, that delivery of new cars would be cut off if they did not sign up. Attorneys for the dealers advised that it would be illegal for the dealers to sign the proposed contracts, since they would in effect deprive their employees of the right to free choice of what organization, if any, they choose to join. The AFL Teamsters union and its business agent, James Hoffa, now are embroiled with the courts on charges of extortion and illegal union activities in connection with their efforts to organize Detroit grocery and meat dealers. A one-man grand jury has been appointed to investigate the union's activities. The Chevrolet dealers are hoping that Ford dealers in the area will back them up in the fight. A sign of encouragement was the statement of Jack Davis, vice-president in charge of sales and advertising for Ford Motor Co., that Ford dealers do not have to join any union so far as the company is concerned.

Graham-Paige Plant Sold to Chrysler

The former Graham-Paige Motors Corporation's plant located at 8505 Warren Ave., Dearborn, Mich., has been sold to the Chrysler Corp. for $2,750,-000. The factory was vacated by Graham-Paige last November when the corporation moved its manufacturing facilities to the Willow Run plant at Willow Run, Mich., which it now occupies jointly with Kaiser-Frazer Corp.

Erected in 1927, the former Graham-Paige plant includes approximately 46½ acres of property near the Detroit-Dearborn line, on which are situated administrative, manufacturing, engineering and power plant buildings, having a total floor area of approximately 1,066,000 sq ft.

CALENDAR

Conventions and Meetings

Mid-America Exposition, Cleveland — May 23-June 2
Golden Jubilee, Detroit — May 29-June 9
SAE Summer Meeting, French Lick, Ind. — June 2-7
Amer. Soc. of Mechanical Eng.—Detroit — June 17-20
Institute of the Aeronautical Sciences, Annual Summer Mtg., Los Angeles — July 18-19
SAE Natl. West Coast Trans. and Maint. Meeting, Seattle — Aug. 22-24
Natl. Aeronautic Assoc. of Canada, International Air Show, Toronto — Aug. 30-Sept. 7
Natl. Chemical Exposition, Chicago — Sept. 9-13
SAE Natl. Tractor Meeting, Milwaukee, Wis. — Sept. 11-12
Instrument Society of America, 1st Natl. Show, Pittsburgh — Sept. 16-20
SAE Natl. Transportation and Maintenance Meeting, Chicago — Oct. 16-17
SAE Natl. Fuels & Lubricants Mtg., Tulsa — Nov. 7-8
American Welding Society Annual Meeting, Atlantic City — Nov. 17-22
Natl. Metal Congress and Exposition, Atlantic City — Nov. 18-22
SAE Natl. Air Transport Engineering Mtg., Chicago — Dec. 2-4
Automotive Service Industries Show, Atlantic City — Dec. 9-14

PERSONALS

Recent Appointments Among Automotive and Aviation Manufacturers:

General Motors Corp., Pontiac Motor Div.—**A. F. Heineman,** Asst. Service Mgr.

Willys-Overland Motors, Inc.—**Walter D. Appel,** Asst. to Vice-Pres. of Engineering in chg. of production development. **M. R. Pence,** Asst. Sales Mgr., in chg. of eastern half of the United States. **Howard O. Lund,** Asst. Sales Mgr.

Willys-Overland Export Corp.—**Charles S. Dennison,** Mgr. of Advertising and Sales Promotion.

Nash-Kelvinator Corp., Nash Motors Div.—**E. E. Stephenson,** Organization Mgr. **Campbell Wood,** Works Mgr., Pacific Coast plant. **J. E. Lamy,** Sales Mgr., Nash Motors of Canada.

Graham-Paige Motors Corp., **Paul W. Heasley,** elected Asst. Treasurer.

Gar Wood Industries, **Charles W. Perelle,** elected president.

Curtiss-Wright Corp., Propeller Div. —**Gordon W. MacKinney,** Asst. Mgr. of Installations Dept.

Aeronca Aircraft Corp., **Peter Altman,** resigned as member of Board of Directors.

Douglas Aircraft Co., Inc.—**Charles W. Hamilton,** Sales Development Mgr.

Boeing Aircraft Company, **Fred P. Laudan,** Vice-Pres. and coordinator of experimental engineering and manufacturing.

Goodyear Tire & Rubber Co., Western Div.—**E. T. Rainey,** Mgr. of Manufacturers Sales.

Ethyl Specialties Corp., **Harry G. Kebel,** Adv. Mgr. and **Henry S. Bean,** Sales Promotion Mgr.

General Motors Corp., New Departure Div.—**Alwin A. Gloetzner,** Mgr. of Southeastern territory.

The Bearings Co. of America, **Jack L. Straub,** retired as director and chairman of the board of directors.

E. I. duPont de Nemours & Co., Inc., **Jasper E. Crane,** retired as a vice-president and member of the Executive Committee; **Dr. Crawford H. Greenewalt,** Asst. General Manager of Pigments Dept., succeeds Mr. Crane. **James B. Eliason,** retired as a vice-president and treasurer and **Walter J. Beadle,** 1st asst. treasurer, succeeds Mr. Eliason.

Alloy Rods Co., **M. G. Sedam,** Vice-Pres. in chg. of research and production.

Landis Machine Co., **J. J. Schmidt,** Superintendent, succeeding J. G. Harper.

General Electric Co., **J. J. Nance,** member of President's staff.

General Electric Co., Apparatus Dept.—**F. K. McCune** and **B. R. Prentice** appointed members of Apparatus Design Engineering staff.

Edward G. Budd Mfg. Co.—**Major General G. M. Barnes,** engineering assistant to the President.

Wayne Pump Co., **Eric Olsen,** Mgr. of the new Aviation Div.

International Harvester Co., **Judson F. Stone,** resigned as chairman of the board of directors. **Fowler McCormick,** formerly president, elected chairman of the board. **John L. McCaffrey,** elected president to succeed Mr. McCormick. **W. E. Worth** and **P. V. Moulder,** elected executive vice-presidents. **W. C. Schumacher,** Gen. Mgr. of Motor Truck Div.

The Cleveland Crane & Engineering Co., **Herbert T. Florence,** elected president and general manager.

Bryant Machinery & Engineering Co., **Howard F. MacMillin,** elected vice-pres.

The Eastern Machine Screw Corp., **L. K. Burwell,** Treas. and Gen. Mgr., succeeding **Thomas W. Ryley,** deceased; **John Rogers,** Asst. Treas. & Purchasing Agent; **Thomas W. Higgins,** Secretary and **Elizabeth J. Farrell,** Asst. Secretary.

Pittsburgh Plate Glass Co., **Robert Wardrop,** Asst. Mgr. of Glass Advertising and Promotion.

SKF Industries, Inc., **C. R. Mabley,** retiring from sales staff after 31 years.

Empire Tool Co., **F. Gordon Sporr,** Secretary-Treasurer. **David B. Grant,** Asst. Sales Mgr.

Standard Motor Products, Inc., **J. Fred Kenny,** Sales Mgr.

Aviometer Corp., **Deam W. Given,** General Sales and Advertising Mgr.

Bacharach Industrial Instrument Co., **Col. A. H. Anderson,** Mgr. of Heating Div.

Bellevue Industrial Furnace Co., **R. B. Hammond,** General Mgr., Secretary and Treasurer. **E. W. Schoen,** Metallurgical Engineer.

The B. F. Goodrich Co., Tire Div.—**Dr. E. T. Lessig,** Mgr. of Textile Control. **B. A. Evans,** Mgr. of Wheel and Brake Mfg. Dept. **William L. Jenkins,** Mgr. recently created electronic applications development dept. **W. F. Billingsley,** Mgr. of tire construction.

Freedom-Valvoline Oil Co., **William G. Bechman,** chairman of the board of directors; **Gus P. Doll,** vice-chairman of the board of directors, executive vice-president and **Earle M. Craig,** president.

Survey Shows Car Output Under 2,245,000 for Year

Even with the prompt ending of the coal strike and the absence of other difficulties such as labor troubles and shortages of supplies, the automobile industry will not be able to produce more than 60 per cent of the 1941 output of new cars during the entire period of 1946, according to a report by the National Automobile Dealers Association. This would mean an outside estimate of 2,245,000 cars for the year.

The estimate is based on a canvass of the automobile manufacturing industry. A survey of the steel situation indicates that with full capacity production from now on, not enough cold rolled steel can be turned out for more than 2,500,000 cars. During April new car production was just a little more than a week's output before the war.

Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for **AUTOMOTIVE *and* AVIATION INDUSTRIES**

Moderate fluctuations of general business activity are indicated. The *New York Times* index for the week ended May 11 stands at 124.3, as compared with 126.8 for the preceding week and 141.4 a year ago.

Sales of department stores, as reported by the Federal Reserve Board, for the week ended May 11 rose to a total equaling 273 per cent of the 1935-39 average, as compared with 248 in the preceding week. Sales were 39 per cent above the corresponding distribution in 1945—which was affected by V-E Day celebrations—as against a like advance of 29 per cent recorded for the week before. The aggregate in 1946 so far reported is 25 per cent greater than the comparable sum in 1945.

Electric power production during the week ended May 11 registered a moderate reduction. The output was 9.1 per cent below the comparable amount last year, as compared with a similar recession of 8.8 per cent reported for the preceding week.

Railway freight loadings during the same week totaled 684,942 cars, 2 per cent more than in the week before but 18.3 per cent below the corresponding number a year ago.

Crude oil production in the week ended May 11 averaged 4,748,700 barrels daily, 27,500 barrels more than the average for the preceding week but 111,515 barrels below the comparable figure in 1945.

Bituminous coal and lignite production during the week ended May 4 was estimated at 520,000 tons, as compared with 750,000 tons in the week before and 10,742,000 a year ago. The output in 1946 so far reported is 20.1 per cent below the corresponding production in 1945.

Civil engineering construction volume reported for the week ended May 16 by *Engineering News-Record* is $137,822,000, slightly more than the figure for the preceding week and 374 per cent above that reported a year ago. The twenty-week total recorded for 1946 is 202 per cent more than the comparable sum in 1945. The increase shown for private construction is 589 per cent, and the advance in public projects is 49 per cent.

The wholesale price index of the Bureau of Labor Statistics for the week ended May 11 is 110.1 per cent of the 1926 average, as compared with 109.9 for the preceding week.

Member bank reserves declined $99,000,000 during the week ended May 15. Underlying changes thus reflected include a rise of $33,000,000 in Reserve bank credit and a gain of $190,000,000 in Treasury deposits with Federal Reserve banks, accompanied by a reduction of $8,000,000 in money in circulation.

Total loans and investments of reporting member banks declined $366,000,000 during the week ended May 8. A reduction of $17,000,000 in commercial, industrial and agricultural loans was recorded. The sum of these business loans, $7,456,000,000, shows a net increase of $1,627,000,000 in twelve months.

Advertising Note

Florez, Phillips & Clark have been appointed advertising counsel by Superdraulic Corporation, Dearborn, manufacturers of hydraulic pumps, motors, transmissions, and valves.

Golden Jubilee Pioneers Committee

The Honorary Pioneers Committee selected by the Golden Jubilee Committee and invited to be present at the dinner and tribute to the pioneers on May 31 as representatives of the many hundreds who helped inaugurate the automotive age in America comprised the following:

Herbert W. Alden
First identified with the automobile industry as assistant engineer, motor car department of the Pope Mfg. Co. He later joined the Timken-Detroit Axle Co. Mr. Alden is a past president of the S.A.E.

Walter C. Baker
A pioneer designer and manufacturer of automobile component parts and producer of one of the earliest electric vehicles.

Oliver E. Barthel
A pioneer automotive designing engineer who worked on early models of Fords and Cadillacs. He designed engines and other basic automotive units for well-known pioneer automobile manufacturers, and developed the taper automobile frame and the first all-steel automobile body.

Carl Breer
While still in his teens, he designed, built and operated a pioneer steam automobile in California. Through ensuing years he was automotive engineer of various companies, including Studebaker Corp., Willys Corp. and Maxwell Motor Car Corp., and is now director of research for Chrysler Corp.

Alanson P. Brush
Worked on the design of motors for the first Oldsmobile. Designed the first one-cylinder Cadillac, and produced the well-known Brush Runabout.

Henry Cave
Famous automotive engineer, did consulting work at Hartford, Conn., for many of the successful automobile and truck companies. He joined the industry in the middle 1890's as a member of the English Daimler Co. He is a member of most of the engineering societies in this country.

Louis S. Clarke
Organized the Pittsburgh Motor Vehicle Co. and the Autocar Co. He pioneered production of the shaft driven vehicle as opposed to the chain drive.

W. L. Connelly
Pioneer petroleum industry executive, now chairman of the board of Sinclair Prairie Oil Co.

George C. Diehl
Pioneer highway engineer, was president of the American Automobile Association in 1921 and 1922. Now president of the Automobile Old Timers.

David C. Fenner
Vice president of Mack International Motor Truck Corp. Has been actively engaged in various phases of automotive industry since studying automotive design at the Providence, R. I., YMCA in 1895. Mr. Fenner raced in the first mile track speed contest in America.

George F. Fox
President of Henry H. Cross Co., an oil refining concern at Chicago, Ill., and other cities. Mr. Fox has been in the petroleum business since 1899 and executive of many concerns producing motor fuel.

David M. Goodrich
Chairman of the Board since 1913 and former president of the Goodrich Rubber Co. He was born in Akron and is the son of the founder of the Goodrich Co., Dr. Benjamin Franklin Goodrich.

B. A. Gramm
Pioneer manufacturer of trucks and developer of the power take off that utilizes motor vehicle engine power in operating farm and other machinery.

Walter Griffith
Worked with Alexander Winton on his first car and later pioneered with the Peerless and White steamers. A pioneer toolmaker, Mr. Griffith has been with the Ford Motor Co. for 22 years.

Frederick H. M. Hart
Pioneer designer and producer of steam automobiles. He produced engines for Lane Bros. steam cars. Mr. Hart has subsequently been a supplier to various automotive concerns.

C. B. Hayes
Pioneer manufacturer of automobile wheels. Founder of the Hayes Wheel Co., Mr. Hayes now is director of Kelsey Hayes Wheel Co., and president of Hayes Industries, Inc., manufacturer of automotive parts, Jackson, Mich.

William T. Hunter
Developer of the Schraeder valve used on pneumatic tires.

Joseph W. Jones
Pioneer designer who manufactured a famous early speedometer. Also pioneered in the manufacture of taximeters which were marketed in 1908. He built a steam car in 1898.

C. W. Kelsey
Winning driver in the early Glidden tours with the Maxwell car to which he contributed many new features. He is now president of Rototiller, Inc., Troy, N. Y.

H. O. Koller
Pioneer dealer. Winton, Oldsmobile, Packard, Ford, Dodge, Peerless, Reo, Pope-Toledo and Pope-Hartford cars hve been sold by him. Now a Buick dealer in Reading, Pa.

A. S. Krotz
Entered the industry in 1897. Took out first automobile patent in that year. Was engaged in the mannufacture of roller bearings, axles and wheels in Springfield, Ohio.

P. W. Litchfield
Pioneer automobile tire manufacturer. Formerly superintendent, factory manager, vice-president, president, and now board chairman of Goodyear Tire and Rubber Co.

Frederick S. Moskovics
Pioneer automobile manufacturer and racer. Has been associated with Franklin, Stutz and Marmon, and is now New York representative of A. O. Smith Co.

Charles S. Mott
Pioneer manufacturer of wheels and axles. Former head of Western-Mott Axle Co. and former director of General Motors. Mr. Mott pioneered in the formation of automobile clubs.

Arthur Lee Newton
Pioneer automobile dealer who has handled the Woods Electric, Northern, and Pope-Hartford. Currently a Buick dealer in New York City and vice-president of Automobile Old Timers.

J. Edgar Pew
Vice-president of Sun Oil Co. of Philadelphia, Pa. Entered the oil industry at the age of 16 years. He was the second president of the American Petroleum Institute and chairman of its committee of petroleum resources.

Albert L. Pope
With his father in the Pope Manufacturing Co. at Hartford, Conn., he made the Pope-Hartford, Pope-Tribune and Pope-Toledo Cars.

Thomas J. Regan
Entered the industry in 1898. Was formerly a director of the Electric Storage Battery Co. and of the Electric Vehicle Co.

R. J. Schmunk
Formerly associated with the Peerless Motor Car Co. Now president of the Cleveland Automobile Club.

C. W. Seiberling
Entered the rubber industry in 1895 as sales manager for the Akron-India Rubber Co. Entered the Goodyear Tire and Rubber Co. in 1898. Has been first vice-president of the Seiberling Rubber Co. since 1922.

F. A. Seiberling
For many years was president of the Goodyear Tire and Rubber Co. President and founder of the Lincoln Highway Association. Now president of the Seiberling Rubber Co.

E. G. Seubert
Chairman of the executive committee of the Standard Oil Co. of Indiana. Entered the oil industry as a mechanic's helper in 1891. Mr. Seubert is a director of the American Petroleum Institute, and served on the staff of the Petroleum Administrator for War and the Petroleum Industry War Council.

Claude Sintz
Pioneer seller of automotive parts. Mr. Sintz's firm built motors which were adapted to and used in some of the first automobiles, including early models produced by Charles B. King and Elwood Haynes.

Richard H. Trimpi
Pioneer manufacturer of windshields and bumpers. Formerly with the Waverly Electric Co. and the Yale Co. Founder of the Electric Vehicle Co. Mr. Trimpi entered the industry in 1899.

A. P. Warner
Builder of early speedometer, including the well-known model bearing his name.

J. C. Weston
Formerly vice-president and general manager of the United States Rubber Co. President of the Rubber Association of America in 1926 and 1927. Mr. Weston is now associated with the General Tire and Rubber Co. in an executive capacity.

Lincoln Arc Welding Foundation Program

An exceptional opportunity for those engaged in the design, manufacture or construction of any type of automotive vehicle and the mechanical and structural parts of such vehicles, is offered by The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio, in the announcement of its new $200,000 "Design-for-Progress" Award Program.

"Automotive," one of 15 classifications, is divided into two divisions: (1) Motive Power or Motive Power Accessories; and (2) Structures or Structural Accessories. "Automotive" maintenance workers may also enter the competition under the Program's "Maintenance" classification.

Twelve awards, totaling $9,000, established for the "Automotive" classification are: Division one—first $700, second $500, third $250, fourth $150; division two—first $700, second $500, third $250, fourth $150; classification—first $2,500, second $1,500, third $1,000, fourth $800.

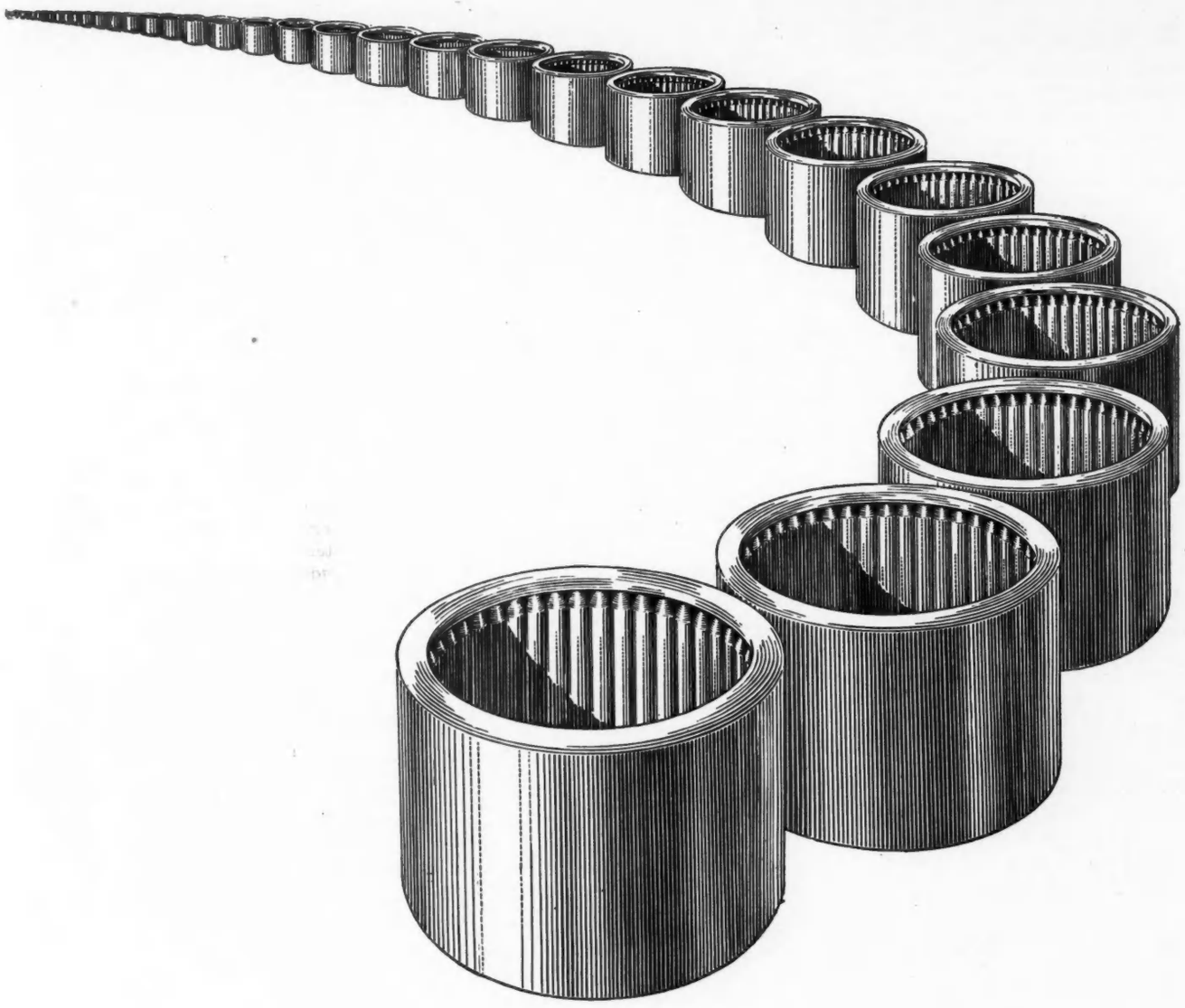
Three winners of divisional and classificational awards will also be possible recipients of the main program awards of $10,000, $7,500 and $5,000, respectively. The principal program award, which may be won by a paper in the "Automotive" classification, is $13,200.

An author entering his paper in either division of the "Automotive" classification, not winning any other award, may still win one of the 217 honorable mention awards of $100 each.

Complete details of The $200,000 "Design-for-Progress" Award Program, which closes June 1, 1947, may be obtained by writing the secretary, The James F. Lincoln Arc Welding Foundation, Cleveland 1, Ohio.

Morse Twist Drill Co. Acquired by Van Norman

An announcement by James Y. Scott, president of the Van Norman Co. of Springfield, Mass., states that Van Norman has purchased substantially all of the outstanding stock of the Morse Twist Drill and Machine Co. of New Bedford, Mass. Morse Twist Drill will be operated as a separate corporation, and will remain in New Bedford.



They're cutting operating costs all along the line

Economy of operation is an inherent feature of Torrington Needle Bearings, and it shows up in the form of measurable cost savings all down the line. . . :

In power costs . . . The tremendous radial capacity of Needle Bearings, combined with their low coefficient of friction and equalized load distribution at operating speeds, assures minimum starting and running friction . . . less power consumption.

In lubrication costs . . . The close-fitting, turned-in lips of the hardened outer shell form a reservoir to retain the lubricant and distribute it evenly over all of the bearing surfaces. Thus, less frequent lubrication and maintenance are required, and bearing wear is reduced to the vanishing point.

In servicing or replacement costs : : : Needle Bearings also contribute marked economies. They never seem to need attention, seldom if ever is a replacement required. This is due directly to their design, high load capacity and efficient lubrication.

In your own industry, compact, low-cost Torrington Needle Bearings have solved innumerable friction problems. Our Catalog 32, copy of which is available upon request, will give you a comprehensive picture of Needle Bearing advantages as applied to the machines *you* design, build or operate.

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THE TORRINGTON COMPANY

TORRINGTON, CONN. SOUTH BEND 21, IND.

Offices in All Principal Cities

TORRINGTON NEEDLE BEARINGS

Willys Expansion Program

Willys-Overland Motors, Inc., has announced a $21 million immediate expansion program, largest in the company's 40-year history. The program has been approved by the board of directors and provides for a more largely self-contained automotive plant at Toledo which will have an eventual yearly capacity of 300,000 vehicles.

Under the proposed expansion, Willys-Overland will produce its own motors, from original castings to finished power plants, and will install expanded body stamping and assembly lines and ultra modern body and trim facilities.

In addition to expanding the four-cylinder motor assembly line to supply increased capacity for the utility vehicle program built around the jeep motors, there will be added a completely new six-cylinder motor production line for passenger car models.

At a cost of approximately $3,700,000, Willys-Overland has purchased the Wilson Foundry & Machine Co. of Pontiac, Mich. The Wilson company has only recently been completely mechanized. It has a substantial volume of orders on its books, in addition to the output needed to fill Willys-Overland requirements. There are also several post-war projects which have been engineered and developed by Wilson foundry.

Two-Ton Rating for 1946 Ford Trucks

A new two-ton nominal rating for the 1946 Ford truck has been announced by the Ford Motor Co. truck division. The new rating applies when the truck is equipped with a two-speed axle, heavy duty double channel frame, 8:25 by 20 10-ply dual tires and power brake. Gross vehicle weight ratings are 14,500 lb and 15,000 lb respectively for conventional and cab-over-engine models. The new truck is available with either the 100 hp V-8 engine, or the 90 hp six-cylinder truck engine.

Automotive Engineers Addressed by Labourdette

Jean Henri Labourdette, president, Societe des Ingenieurs de l'automobile (SIA) of France, addressed a small group of automotive engineers in Detroit on the eve of the Golden Jubilee in May, on the evolution of autobody styling since the earliest days of the industry. M. Labourdette, internationally known as a custom body designer, is a scion of a famous family of French carriage builders which has built custom cars for the Czar of Russia and Alfonso, King of Spain.

Apart from the evolution of body styling, M. Labourdette has given considerable study to the problem of visibility in motor cars. His latest contribution is the development of body structure, called Vutotal, without pillars at the front or side so as to provide an unobstructed view of the road. In this construction he employs tempered safety glass 11 mm (about 7/16 in.) in thickness for the windshield and side windows. It is claimed that this gives sufficient structural support for the roof panel. Photographs taken from the interior of a sedan so constructed show an amazingly clear view of the surroundings, free from interference.

ASTM to Hold 24 Technical Sessions at Annual Meeting

Twenty-four technical sessions have been arranged for the presentation of over 150 technical papers and reports by the country's outstanding authorities in the field of materials at the 49th Annual Meeting of the American Society for Testing Materials in Buffalo, N. Y., during the week beginning June 24. In addition to the intensive technical program which includes several special symposiums, there will be in progress throughout the week the Society's 7th Exhibit of Testing Apparatus and Related Equipment, and a photographic exhibit on the theme, Materials Testing and Research.

During the week of the meeting, the Society's large number of technical committees will also have sessions. There will probably be about 250 committee meetings.

As somewhat of an innovation this year, special sessions have been arranged for the presentation of the Society's technical committee reports. By concentrating these reports, which calls for the approval by the Society's Annual Meeting of the large number of new and revised specifications and tests, more time is made available in the other sessions for presentation and discussions of the technical papers.

"Executive" Transports for Delivery Next Month

Douglas Aircraft Co. will begin deliveries of its newly announced DC-3C "Executive" transport early in July. The executive model is a post-war variation of the DC-3, and for the first time offers to private users all the safety, comfort and dependability of airline equipment standard throughout the world, the company said. Price of the new craft will be $115,000.

Nine DC-3C's already have been sold, according to Marshall S. Neal, sales executive, and deliveries are promised four months from order date.

Additional Facilities for Testing Ford Products

Added facilities for year-round testing of Ford Motor Co. products have been acquired at Phoenix, Ariz. The location in the Southwest was selected because of the extremes of terrain, altitude and weather encountered in that area.

Road tests at Phoenix will enable company engineers to double-check, under actual operating conditions, results of the test track and weather tunnel findings.

Phoenix provides virtually unlimited opportunities for all manner of tests. Within a radius of 100 miles extremes of heat and cold, humidity, dust, sand, good roads and bad are available. In addition, Yarnell Hill, located nearby, provides a punishing 2000-ft climb in only seven miles.

Advertising Note

John P. Gaty, vice-president and general manager of Beech Aircraft Corporation of Wichita, Kansas, has announced the appointment of Ruthrauff & Ryan, Inc. as the company's advertising agency.

Monthly Production of Motor Vehicles in U.S. Plants*

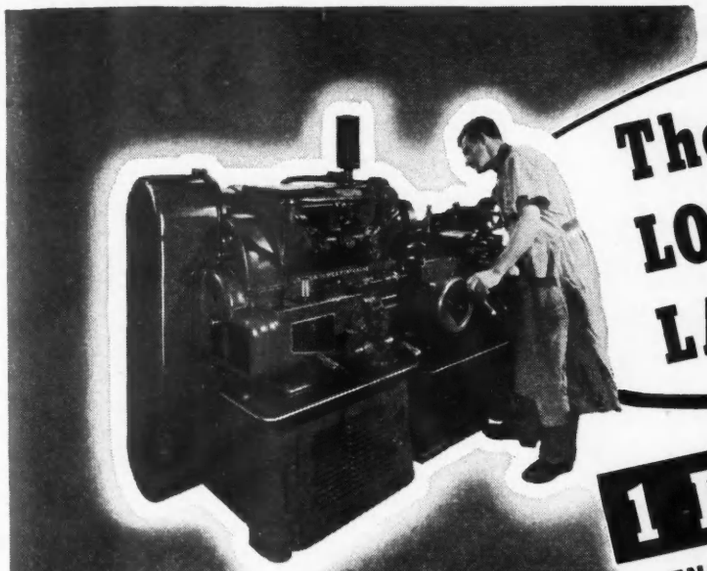
Passenger Cars	
January	58,775
February	47,665
March	90,045
Total — 3 Mos.	196,485
April	152,206
Total — 4 Mos.	348,691
Trucks	
January	54,684
February	28,692
March	39,459
Total — 3 Mos.	122,835
April	81,282
Total — 4 Mos.	204,117
Total — Cars and Trucks	
January	113,459
February	76,357
March	129,504
Total — 3 Mos.	319,320
April	233,488
Total — 4 Mos.	553,808

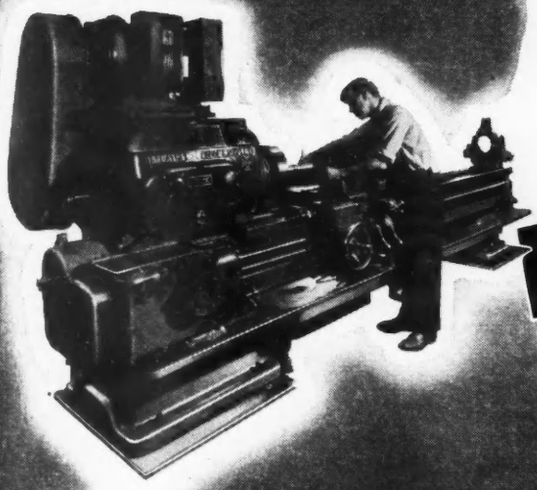
*Civilian Production Administration.

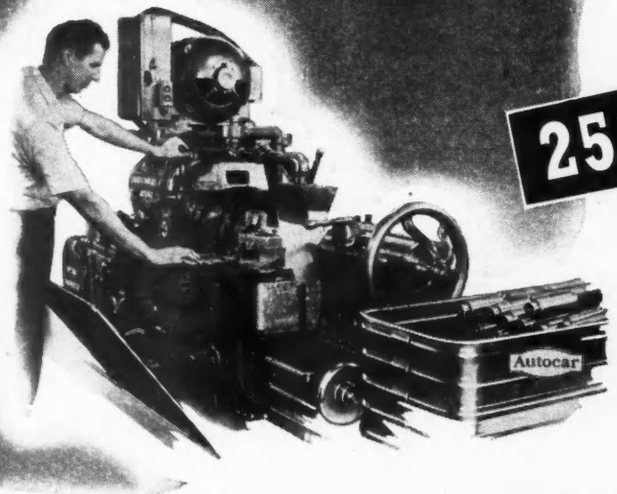
Weekly Production of Cars and Trucks in U.S. and Canada*

Week ending	1946	Corresponding Week in 1941
Jan 5	13,920	76,690
12	23,340	115,935
19	28,465	124,025
26	29,410	121,948
Feb 2	29,295	124,400
9	23,785	127,675
16	21,555	127,510
23	19,410	127,740
Mar 2	17,575	126,550
9	23,050	125,915
16	35,020	131,410
23	37,285	123,805
30	43,070	124,165
Apr 6	47,735	116,255
13	49,425	99,260
20	57,565	99,945
27	64,620	108,165
May 4	67,060	130,610
11	71,335	132,380
18	48,565	127,255
25	53,020	133,560
Total	804,505	2,525,198

*Compiled by Ward's Automotive Reports.







There's a LODGE & SHIPLEY LATHE for

1 PIECE ... 12" TO 25"

ENGINE LATHES You can't beat these Engine Lathes for general utility on single piece jobs. They're built with extra rigidity, take heavy hogging cuts without vibration. As a result, you can demand more from these lathes and get it—in much less time. Write on your company letterhead for detailed literature No. 500, 503, 605.

25 PIECES ... 12" TO 25"

MANUFACTURING LATHES give you remarkable time savings on repetitive work in large or small lots. Manufacturing attachments form a profitable production unit. These permit multiple tooling and easy, rapid duplication of lengths and diameters. An L & S Manufacturing Lathe need never be idle—it's an engine lathe for single piece jobs, rivals an automatic on production work. Write for detailed literature No. 608, 615

25,000 PIECES

2A OR 3A DUOMATICS are fully automatic, even on complex multiple tool jobs. So easy, any unskilled operator can handle one or more of these lathes. You just put in the workpiece, start the cycle, take the piece out when finished. It's like two lathes in one, with front and rear carriages and tool slides, operated singly or together. A Duomatic turns thousands of pieces with amazing savings in time and effort. The 2A is for small jobs, the 3A for larger work. Write for detailed literature No. 601 and 620.

THE LODGE & SHIPLEY MACHINE TOOL CO.

L & S LATHES

CINCINNATI 25, OHIO, U. S. A.

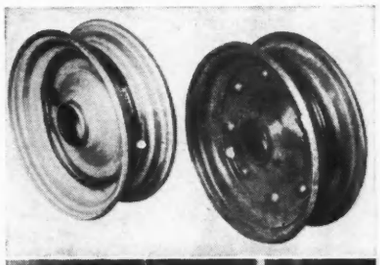
MACHINE TOOL DIVISION 3055 COLERAIN AVE. • SPECIAL PRODUCTS DIVISION 800 EVANS ST.

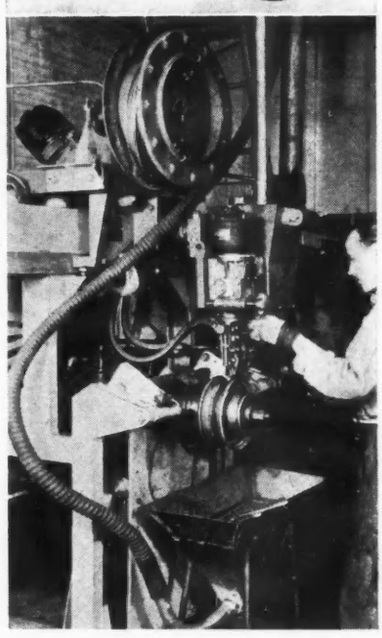
Arc Welded Steel Has Double Strength

Tests recently completed by the Saginaw Products Corp. disclose that an arc welded wheel, mounted with a 5.00-16-6 ply tire, shows a wheel spread of only 9/32-in. between flanges when the tire is inflated to a bursting point off 340 lb inflation pressure and that no other damage to the wheel is shown. No wheel of this type made by any other method of fabrication has been able to withstand half that pressure, company officials declare.

The wheels on which these tests were made are stamped from 14-gage stock. The area to be welded is reduced to 16-gage because of a deep draw at the center of the rim, and the circumference at the weld is 25 in. Using the automatic welder known as Lincolnweld, made by the Lincoln Electric Co., with unit set at 425 amp and 28 volts, the welding time is 10 sec. The floor to floor time is around 45 sec per wheel which is expected to be lowered by improvements on the fixture. In this process the cost of welding material, including wire and flux, is approximately one cent per wheel.

Saginaw arc welded wheel (left) and riveted wheel (right)





Automatic arc welder used to manufacture new double-strength wheel

Northrop XB-35

(*Continued from page* 45)

tem supplied by eight engine-mounted pumps that are said to absorb up to 92 hp.

The electrical system of the XB-35 includes four engine driven, three phase, 400-cycle, 208 v alternators, the total rated output of which is 120 kw. They generate electricity to operate the gun turrets, bomb bay doors, landing gear, landing gear doors, and other equipment.

XB-35 DATA

Wing span	172 ft
Root chord	37.5 ft
Tip chord	9.33 ft
Max. wing thickness (approx.)	7 ft
Over-all height	20.1 ft
Over-all length	53.1 ft
Weights:	
Design empty	89,000 lb
Design loaded	162,000 lb
Overload gross	209,000 lb
Landing gear, tricycle type:	
Main gear dual wheels, diameter	5.5 ft
Nose gear single wheel, diameter	4.67 ft

GAIRING PRODUCTS—GAIRING MEN

Gairing is known by the performance of its tools and the men who sell them. The desire of our representatives to be helpful and their intimate knowledge of the field they serve will win your confidence and respect.

Their names are listed at the right.

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P.O. Box 478, Roosevelt Park Annex, Detroit 32, Michigan

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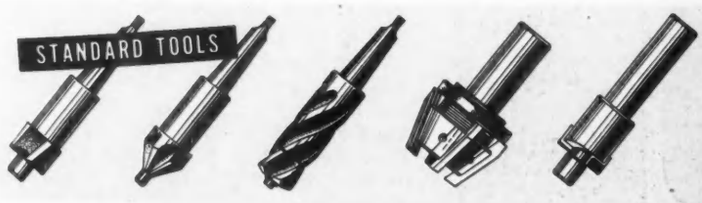

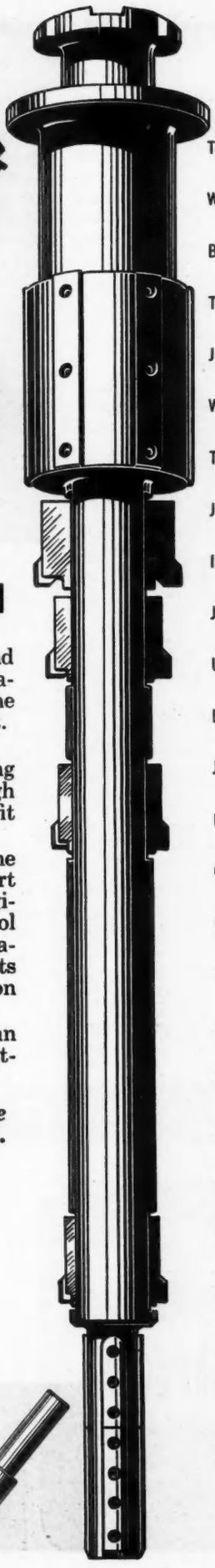

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Hi-Speed Tools, Ltd.

Indianapolis Race Cars

(*Continued from page* 24)

received a new pair of rear hubs as a result of the hub shell failure which forced Wilbur Shaw from the 1941 race just as he was well on his way to another win. At that time the rear hubs were 42 mm. The new ones are 52 mm.

Russell Snowberger approached the same problem in a slightly different manner. His rear hubs were left at the original 42 mm size but he made up new hub shells with heavier cross section at the critical points. In both his case and the Boyle changes the new wheels were laced up with wider base dural rims of American manufacture.

The Italian Maserati team did not arrive in the United States until rather late in the month. It is understood that shipping arrangements were delayed for various reasons. Their cars were readied in Italy prior to sailing since time would obviously be lacking after arrival at the speedway.

The type 8CL Maserati has appeared at Indianapolis before—Raul Riganti entered one in 1940 which was wrecked early in the race and thus had no fair opportunity to demonstrate its otherwise forceful performance. The current entry was a brand new car, completed since the late war by the brothers Maserati in Italy.

The type 4CL's were, in the absence of the 91 cu in. Mercedes which was to have been brought over by Carracciola, outstanding examples of the very stout competitive qualities which the Italians have bred into their 1½ liter designs. There are strong indications that these cars may be purchased in this country. The new International Formula is said to be based on the 1½ liter maximum for blown engines, and American drivers and car owners could scarcely be criticized for eyeing the 4CL's covetously.

In qualifying for the 1946 race, Hepburn blistered the bricks for a four lap average of 133.944 mph in the Novi Governor Special. This sensational whirl swept away all previous records for the single lap and the four lap qualifying distance at Indianapolis. Hepburn's fastest lap was 134.449.

Deflation or Inflation

(*Continued from page* 15)

unprecedented volume production with relatively low costs of distribution, but the ability of industry operating at lower peace-time levels "to absorb higher labor costs without a corresponding rise in the price to consumers is no longer present." Prices have risen only 23 per cent from 1941 to 1946 while straight time earnings have risen nearly 42 per cent and raw materials, 39.3 per cent.

It is further shown in the study that the labor unions' asserted fear of increased productivity, which was based on the assumption that general productivity had been materially increased during the war, seems without sound basis in fact as, in the first place, the improvement in productivity in the war production period was due chiefly to the abnormally low level at which such production began and, in the second place, a study of productivity in non-war plants discloses that no noteworthy change in productivity occurred therein.

In comment added to the body of the report, Dr. Backman says, "The question is not, 'Will we have inflation?' We already have it. The basic question remains how far it will go? The actions taken to raise wages and in connection with government spending will help to determine the distance."

It is hoped that the report of this masterly study will receive widespread and deeply reflective reading by those, especially, who have the opportunity and the ability to propagate sound thought on this critically important subject.

New Products

(*Continued from page* 48)

cite" is now being investigated by the U. S. Coast Guard for large bands on channel markers and buoys to light them at night without necessitating maintenance or replenishment of a power supply. The plastic is said to have demonstrated durability on exposure to severe weather or salt water.

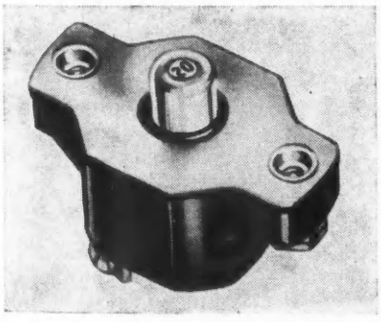
Sheets of "Lucite" containing luminescent pigments called phosphors are now being produced on a small scale, the company said, and are being evaluated for night use, both indoors and out.

The afterglow of this phosphorescent sheeting is claimed to be outstanding in the field of plastics. After exposure to light, the sheeting gives light of maximum brilliance for a matter of minutes, and then continues for ten or twelve hours to give light sufficient to be seen by an eye adapted to the dark. The fluorescent sheeting, on the other hand, does not necessarily store light, but glows brilliantly while subjected to ultraviolet light, commonly called "black" light.

The sheets can be manufactured in a wide range of colors, in all of the standard sizes of regular "Lucite" sheeting, and in a range of thicknesses.

Permanent-Type Electrical Circuit Breakers

Spencer Thermostat Co., Attleboro, Mass., offers a line of automotive circuit breakers which protect electrical circuits from damage due to overloads or short circuits. They are available in automatic and manual reset types,



Spencer circuit breaker

open and weather-proof cases, for every primary and accessory circuit. Typical circuit applications include lights, generator, starter, horns, radio, heater, directional signals, refrigeration equipment, and trailer circuits.

When the manual reset type is specified the circuit breaker snaps the circuit "open" and the operator must reset the button to "reclose" the circuit. Automatic circuit breakers function entirely automatically.

Five Permanent Magnet Materials Announced by G-E

Five new permanent-magnet materials, known as cunico, cunife, vectolite, alnico 12 and silmanal, are recent developments of the General Electric, Schenectady, N. Y. These new materials have many applications in the manufacture of aircraft instruments, as well as other industrial uses where small, lightweight magnets formed in intricate shapes are required.

Cunico is an alloy of copper, nickel and cobalt. Cunico magnets are made from rod, strip or wire stock, and are furnished only in their final shapes because they are age-hardened in the manufacturing process. Cunico is malleable, ductile and machinable, permitting the manufacture of small magnet screws from this material by ordinary screw machine methods, and the punching of intricate magnet shapes.

Cunife is a copper-nickel-iron alloy which has all the physical properties of cunico, differing in that it has directional properties and must be magnetized only along the direction in which

(*Turn to page* 68, *please*)

the material has been cold-worked, to obtain highest magnetic quality. Cunife magnets are made from wire stock in round, square or rectangular form. In addition, cunife wire can be flattened to make thin, narrow shapes. A wide variety of magnet designs can be obtained by forming, drawing, punching or machinging cunife to shape.

Vectolite is the first non-metallic, non-conducting magnet material ever made. It is a hardened, sintered combination of iron rust and cobalt oxide mixed when still in powder form. Vectolite magnets are extremely light, being non-metallic, and their non-conductive properties prevent electrical losses caused by conduction of current. In addition, they have a high coercive force, or resistance to demagnetizing forces.

Alnico 12 is made up of aluminum, nickel, cobalt, iron and titanium. Magnets made from this material can be used in such applications as in tachometer generators and electronic devices. Alnico 12 magnets are cast, and must be ground to shape.

Silmanal has a high intrinsic coercive force, which makes magnets made from this material useful in instruments where service in strong electrical fields is required. Silmanal is ductile and malleable and can be punched, machined, rolled, or ground. Because of its ductility, silmanal can be made in rod, strip or wire form.

Torque Screw Drivers

Airdraulics Engineering, Inc., New Canaan, Conn., is making a new "Tru-Torque" line of torque measuring and controlling screw drivers in three standard sizes. These sizes are: Small, from 0 to 6 in. torque lb; Medium, from

Tru-Torque screw driver

0 to 12 in. torque lb; Large, from 0 to 25 in. torque lb.

"Tru-Torque" screw drivers come complete with one regular blade for slotted screws, nuts or bolts, one Phillips-type blade, one Allen wrench and pin setter. Snap-on adapter also is available.

Self Tapping Screw

A self-tapping screw designed for making fastenings to comparatively thin sections and bosses in friable and brittle plastics is offered by Parker-Kalon Corp., 200 Varick St., New York 14, N. Y. Named the Type "F-Z," this screw combines the thread-cutting characteristics of the P-K Type "F" with the coarse pitch thread advantages of the P-K Type "Z."

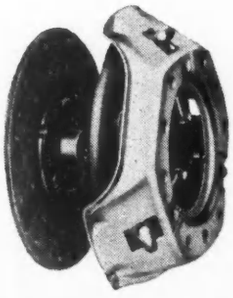
The five cutting flutes of this screw

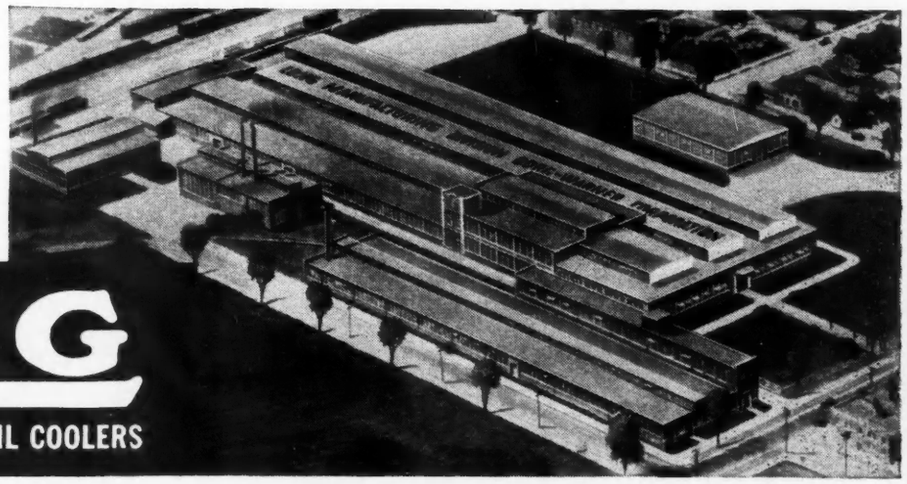
(*Turn to page 70, please*)

SINCE 1903

Ours has been a lifelong association with the automotive industry, for Long radiators have equipped fine cars and commercial vehicles since 1903. And since 1922 the Long-developed clutch, famous for its easy pedal action, has been standard equipment on millions of cars, trucks and buses. We pay tribute to a dynamic industry, its pioneers and its leaders who put the world on wheels. From them, we know, will come another 50 years of transportation progress.

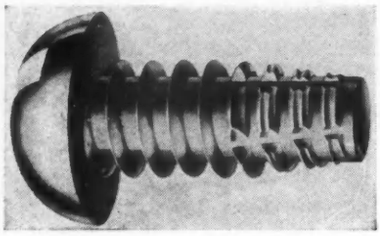
LONG MANUFACTURING DIVISION
BORG-WARNER CORPORATION
DETROIT 12 AND WINDSOR





LONG

CLUTCHES • RADIATORS • OIL COOLERS



Parker-Kalon Type "F-Z" self-tapping screw

distribute cutting pressure evenly—prevent localized pressure and cracking—especially in friable or brittle plastics, by permitting chips to drop to the bottom of the hole.

The coarse threads are said to eliminate binding by acting as an additional reservoir for the displaced material, and also offer greater resistance to stripping out of the material.

Chausson Enters Bus Field

(*Continued from page* 33)

with insulating material. Only a single deck model is built, this having an entrance by the side of the driver and an exit at the rear, both doors being controlled by the driver with compressed air mechanism. There is a central aisle, with double seats left and right of it, facing forward.

The power plant is a Hotchkiss six-cylinder unit of 4.13 in. by 4.53 in. bore and stroke, originally designed for service in tanks. The drive is taken through a five-speed transmission built by Renondin & Losson, through a two-stage drive shaft to a double reduction rear axle with torque tube anchored to the under part of the platform. As an alternative it is proposed to offer a high-speed Diesel engine now being built by Panhard & Levassor. In place of the mechanical transmission, a Cotal 8-speed electro-magnetic gear can be supplied. This gives a foolproof finger tip gear shift, with the possibility of selecting any gear for emergency braking, but it is more costly to produce than the mechanical transmission.

The powerplant—engine, clutch and transmission has four-point flexible attachment, through rubber blocks, to the frame. After drive connections have been broken, only four bolts have to be removed to free the engine, and this can be wheeled forward, together with the radiator, on a bogey. It is claimed that a change of powerplant can be made in three hours.

As the weight is equally distributed between the two axles, single tires are used. These are Michelin steel carcass type, inflated to 106 lb. Brakes are 17 in. in diameter, with four in. shoes in front and five in. on the rear. The Westinghouse compressed air brake system is used for brake application, and there is also a compressed air steering servo, which reduces the effort required of the driver, but leaves the steering direct in case of compressed air failure. Used mainly for suburban services, it is stated that the Chausson vehicle will be supplied for service in Paris, where the practice for years has been to use single-decker buses of conventional chassis type, with driver over the engine and a single rear entrance onto an open platform.

Boeing Stratocruiser Specifications Revised

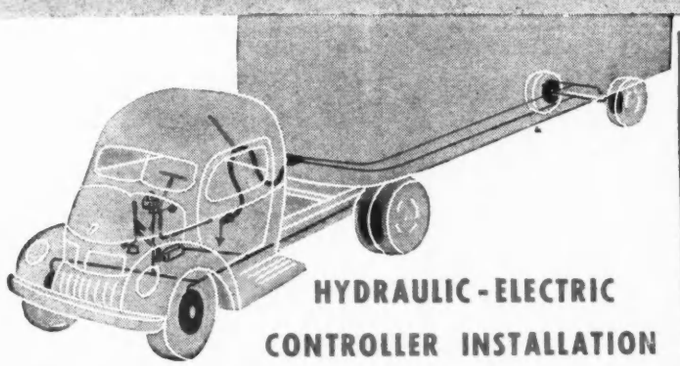
Revised specifications recently released on the Boeing 377 Stratocruiser, commercial version of the Army trancport C-97, show an increase in carrying capacity. Original specifications were published in the Dec. 1, 1944, issue of AUTOMOTIVE AND AVIATION INDUSTRIES. The revised data follow:

Auburn Mfg. Co. Now The Atwood Clutch Co.

To more closely identify the company with its ownership and its product, the name of the Auburn Manufacturing Co., Auburn, Ind., has been changed to The Atwood Clutch Co., it is announced by W. V. Thelander, general manager.

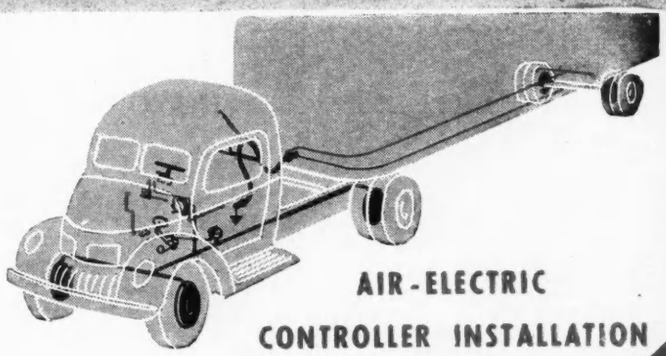
BRAKE ACHIEVEMENT...

Synchronizes Either Type of Tractor Brakes with Trailer Electric Brakes so Foot Pedal Operates ALL Brakes Together



HYDRAULIC-ELECTRIC CONTROLLER INSTALLATION

Controller is easily and quickly fitted into tractor's hydraulic brake line.



AIR-ELECTRIC CONTROLLER INSTALLATION

For tractors with air brakes, the Controller installation can be made with equal speed and ease.

FOOT PEDAL PRESSURE CONTROLS BRAKES ON *Both* TRACTOR AND TRAILER

WARNER
ELECTRIC BRAKES

Data on Aluminum Alloy Bearings

(*Continued from page* 30)

Alcoa XA750—Diesel engine; split type or cylindrical bearings where wall thickness is favorable; where lubrication may not be good; where speeds are extremely high and the crankshaft or journal is hard; and bushing stock.

Alcoa XA80S—As a lining material on steel for general automotive use; bushings, both all-aluminum and steel-backed aluminum.

Engineering

Aluminum bearing alloys machine in excellent fashion. With carbide or diamond tipped tools they can be given a finish better than 15 micro-inches (R.M.S.) by using a feed of about .002 in. per revolution. The speed with which aluminum can be machined is limited only by the speed of the cutting machine. Cutting may be done dry or with ordinary lubricants such as soluble oil. Alkaline lubricants, however, may lead to corrosion and should be avoided.

All-aluminum alloy bearings have given excellent service in Diesel engines where the bearing wall is rather thick and the engine oil temperature is generally below 200 F. On the other hand, where bearing shells are thin and engine oil temperature approaches or exceeds 300 F, difficulty may be encountered with all-aluminum alloy bearings, because of loss of crush and subsequent movement of the bearing shells. This movement may shear off or break-out conventional locking lugs or dowel pin holes may become enlarged. This happens, however, only in cases where the bearing walls are not sufficiently heavy or some error has been made in the bearing design. This may result in part from the fact that when the housing is pulled together a certain predetermined crush imparts a load on the bearing wall; then, as the temperature of the bearing increases under operating conditions, an additional load is applied because of the difference in thermal expansion between the aluminum alloy bearing and the steel or iron housing. Since the expansion of aluminum alloys is roughly twice that of iron or steel, it is therefore important to use the least possible amount of crush at the parting line of the bearing. The crush should be sufficient, however, to give a good bearing back contact with the inside of the housing. By using a minimum crush, the remainder of the resistance of the material to deformation is then available to withstand any additional load that may be caused by differential expansion.

(*Turn to page* 76, *please*)

It's the same picture everywhere—great acceptance greets the arrival and use of the new ARO Model 7000 Air Screw Driver on the assembly lines of scores of industries!

No other tool like it! This pneumatic powered screw driver is no bigger than the average cigar. Weighs only 8 oz. . . . is 4 7/8" long and 3/4" in diameter. Capacity No. 1 to No. 6 screws. Starts automatically—no manual throttle. Drives the screw instantly when tool is applied.

Similarly, ARO Tools speed up and improve efficiency of countless other production jobs . . . including all types of screw-driving, nut-setting, drilling, grinding and other operations. Backed by ARO-engineered accuracy . . . built for dependability. Write for catalog. The Aro Equipment Corp., Bryan, Ohio.

Specify ARO

PNEUMATIC TOOLS

THERE IS AN ARO JOBBER NEAR YOU

Although there have been a number of so-called borderline cases in which aluminum alloy bearings have given an excellent account of themselves in spite of adverse conditions, Aluminum Co. of America would be hesitant to recommend their use in such instances. In order to define in some measure the limitations of aluminum alloy bearings, the following information, resulting from test work and field experience, is submitted. This information, however, should be used only as a guide, and is not intended to convey iron-clad rules which cannot be altered or adjusted as conditions warrant.

When a dowel is used as a method of locking the bearing shell against rotation, a wall thickness of 5/32 in. should be considered the minimum for all-aluminum alloy bearings. This thickness allows for an oil groove that decreases the net section through the dowel hole. Of course, if the oil groove can be eliminated, a thinner wall may then be used with good results. Where conventional locking lugs are used, the minimum wall thickness for an all-aluminum alloy bearing should probably be taken as ⅛ in. Naturally, in either case, the wall thickness has a relation to bearing diameter. At the present time, however, good judgment and experience are the only methods that can be used to determine the correct ratio between bearing wall thickness and diameter.

Joining crush at the parting line should be kept to the particular minimum which will still provide a good contact between the bearing back and the inside of the housing. In most cases from .0015 in. to .0035 in. is ample. The finishes of the back of the bearing and the inside of the housing are probably more critical than that of the bearing running surface. A lower micro-inch finish can be utilized for these parts since the problem of "oil wetness" does not exist. Wherever practical, this finish should be from 8 to 10 micro-inches (R.M.S.) or better. The inside bearing running surface can be around 25 micro-inches without sacrifice of life or performance. Joining faces at the parting line should also have a fine finish and be perfectly flat with respect to the bearing wall.

Bearings should not have too much spread at the parting line. A spread of .005 in. is ample in most cases, although this figure should be reduced as the ratio of wall thickness to diameter increases.

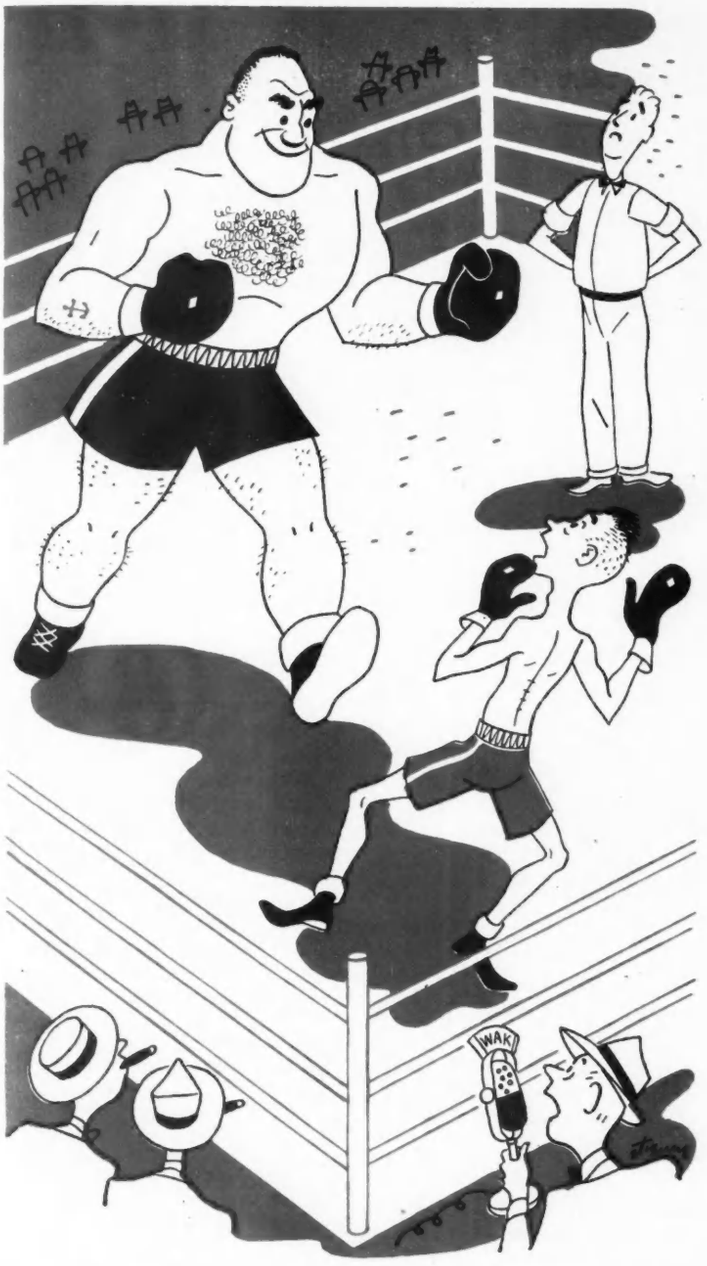
Too much area should not be removed at the parting line to provide for an oil pocket or spreader. Aluminum alloy bearings operate best with high oil clearances, which reduce the need for such devices.

Oil clearance should be kept at a minimum of .001 in. per inch of shaft diameter. This figure seems to be critical since trouble has sometimes been encountered with scuffing in tests where less than .001 in. per inch of shaft diameter has been used. Higher oil clearances with extra oil pump capacity work best with aluminum alloy bearings.

Locking devices that provide the maximum amount of resisting surface should be considered. All conventional methods can be used with good results. Sometimes expedients like radial locking lugs can be used in order to overcome certain mechanical difficulties, such as sharp corners which give rise to stress concentrations. Conventional lugs may be formed with properly designed tools that semi-extrude the material rather than shear it. All such devices must be considered from the viewpoint of economy by the designer. To evaluate completely the cost differential, however, consideration should be given to any operating improvement which might result.

Although shaft hardness does not seem to be critical, a hard shaft will doubtless give longer life than a softer one. A hard shaft also aids in embedding dirt particles into the bearing surface. Aluminum alloy bearings, which were run on a 2¼ in. pin of soft steel (140 Brinell hardness) for 222 hours at a load of 4000 psi and a speed

(*Turn to page* 78, *please*)



you wouldn't match a bantamweight against a heavyweight

Nor should you put carbide cutting tools on a lathe lacking the fundamentals for their most efficient use. These cutting tools have increased horsepower requirements 300 per cent and more. They have increased cutting speeds 200 to 500 per cent.

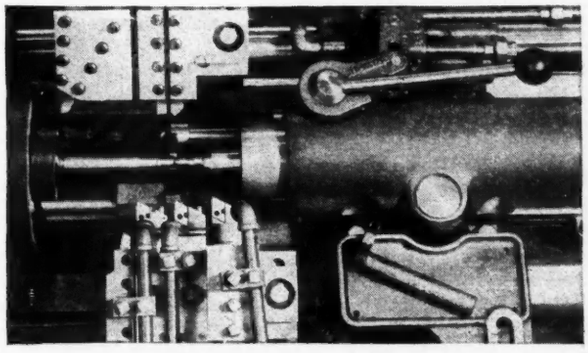
Your profits may well depend upon the efficiency of your turning operations. For instance, in your plant, turning probably accounts for 25 per cent or more of machining time. This could be substantially reduced by the most efficient use of carbide cutting tools, and an important saving in manufacturing cost effected.

It will pay you to check now on the production efficiency of all metal turning equipment in your plant — and to replace it, if need be, with high production war surplus machines or new machines. Jones & Lamson Fay Automatic Lathes and Universal Turret Lathes are designed specifically for the most efficient use of carbide cutting tools.

We are anxious to assist all owners of Jones & Lamson equipment bought from government surplus, to obtain the best possible results from their purchases. Telephone or write to us for complete particulars.

What Horsepower Are YOU Using?

15 horsepower is required to turn and face this small steering rod at the high surface speeds required by the carbide cutting tools. Fay Automatic Lathes are designed specifically for the most efficient use of carbide cutting tools.



Engineered to "Carry the Load" for Most Productive Operation With Carbide Cutting Tools

JONES & LAMSON
MACHINE COMPANY
Springfield, Vermont, U.S.A.

Fay Automatic Lathes

Manufacturer of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers • Ground Thread Flat Rolling Dies.

of 3200 rpm, gave a measurable wear of only .0004 in. on the pin under one bearing and .00055 in. under the other.

Conclusions

All-aluminum alloy bearings are good life insurance for an expensive shaft or journal, because their monometal construction practically eliminates the chances of scoring.

Aluminum bearing alloys have proved in laboratory and field tests that they combine several excellent bearing characteristics; full benefit can be had of these properties when an engine is being designed or redesigned. If provisions are made for ample bearing wall thickness and adequate oil capacity, bearing problems can be reduced to a minimum through the use of aluminum bearing alloys.

By using aluminum alloy bearings in conjunction with adequate oil and air filters and cleaners, engines of the future will have a greatly extended life as well as long operating periods between tear-downs.

With the use of aluminum alloy bearings, tremendous savings in machining time, which in turn result in reduced fabricating costs, can be realized by bearing manufacturers using some existing equipment. Most new equipment, however, will be designed to take even more advantage of the outstanding machinability of the aluminum bearing alloys, limitations now being primarily the speed of most machines.

New Daimler Models

(*Continued from page* 25)

of the king pin carrier which restricts the lateral motion by extending forward and across to a rubber bushed, pin joint near the center of the front cross member. The yoke piece is linked at the top to a bracket that is anchored on top of the adjacent side member.

An interesting point about the body design is that there is no door column between the center window and the rear quarter glass, an unobstructed view thus being allowed. The glass of the windows overlaps in a way that makes it draft and waterproof. In this new body full use is made of electrical controls. Push-button switches operate motors which open and close the windows in the front and rear doors and the glass of the central division. The driver has an electrical control for the rear window curtain.

Daimler Dimensions

	6-Cyl	8-Cyl
Wheelbase, in.	138	147
Front Tread, in.	60	60
Rear Tread, in.	63	63
Overall Length, in.	213	222
Overall Width, in.	73.5	73.5

Golden Jubilee

(*Continued from page* 19)

first car on Detroit streets in 1896.

George Holly, Detroit, carburetor manufacturer, selected by the automotive parts industry as its outstanding pioneer;

Charles W. Nash, Beverly Hills, Calif., who headed some of the largest automobile companies in a long and colorful career;

Ransom E. Olds, Lansing, Mich., who pioneered volume production of automobiles;

Alfred P. Sloan, Jr., New York City, pioneer automotive parts manufacturer (Hyatt bearings) and present chairman of the board of General Motors Corp.;

Charles B. King, Larchmont, N. Y., who built and drove the first car in Detroit, March 6, 1896;

Barney Oldfield, Los Angeles, famous racing driver;

John Van Benschoten, Poughkeepsie, N. Y., who has sold 36 different makes of car since he became a dealer before the turn of the century;

Charles Snyder, York, Pa., who started his selling career with steam cars in the 1890's;

Frank Kwilinski, South Bend, a veteran worker who has just completed 60 years of continuous service with Studebaker Corp.;

John Zaugg, who has worked for White Motor Co. for more than 51 years without a break.

Each of the fourteen pioneers was presented with a tangible token in the form of an aluminum "Oscar," named the Charles Clifton Automotive Award in honor of Charles Clifton, first president of the National Automobile Chamber of Commerce, forerunner of the AMA. Mr. Clifton, who was president and chairman of the board of the Pierce-Arrow Motor Car Co., served as head of the association for 23 years until he retired in 1927. He died the following year. The award itself is an aluminum statuette about 15 inches tall with antique finish. It depicts a kneeling technician holding an old and a new car in one hand, while the other arm is through a wheel, symbol of man's dominance over inertia. The statuette also carries the atomic symbol to carry out the jubilee motif.

Most activities of the Jubilee were held on June 1.

The "Motor City Cavalcade," a parade extending for miles, passed in review before the huge crowds lining Detroit's main thoroughfare, Woodward Avenue. The procession featured early forms of transportation, including old cars and trucks, and floats by Detroit companies and civic, cultural, and historical groups. The day was capped by a public celebration on the streets of downtown Detroit, featuring street dancing, coronation of the jubilee queen, music by nationally known bands and orchestras, and entertainment by radio, screen, and stage personalities.

As a complementary feature, the jubilee committee staged an antique automotive exposition, which opened June 3 in Convention Hall for one week. Approximately 150 old cars and 70 trucks were put on display. The oldest vehicle was an 1893 Bernardi with a one-cycle, platinum hot plate engine and water-cooled muffler. Most of the vehicles were entered in the parade, some under their own power and some on floats. The first Ford car and the King automobile were included in the parade and exposition. Each existing manufacturer had his latest model vehicle on display.

Boeing Producing Plane For Local Airline Service

Boeing Airplane Co. has announced its decision to enter into large scale production of smaller transport planes. The Boeing "417," "little brother" of the 80-passenger Boeing Stratocruiser, has been ordered into quantity production at the Company's Wichita division.

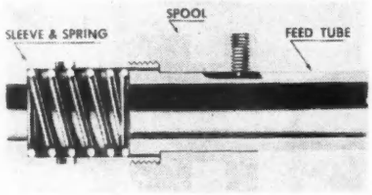
New Production Plant Equipment

(*Continued from page* 44)

feeding workpieces such as headless set screws and short rods for thrufeed thread grinding. When equipped with an automatic hopper the machine is fully automatic in operation except for dressing the wheels and making size adjustments.

MODERN COLLET AND MACHINE CO., 401 Salliotte St., Ecorse 18, Mich., is introducing a complete line of shock-absorbing feed tubes for Brown & Sharpe automatics of all sizes and models which do not have a spring safety device incorporated in the feeding mechanism of the machine.

With these feed tubes, forward movement of the screw machine feed latch is transmitted from the spool to the tube itself through a sleeve and helical compression spring (see cut-awayview). This spring permits normal feed without deflecting; but in case of interference with advance of the feed tube, the spring compresses and the spool slides forward freely on the



Cut-away view of shock-absorbing feed tube

tube, thus preventing breakage of the feeding mechanism or damage to the feed tube.

Where there is any interference with full advance of the stock itself—for example, when the feeding mechanism is set for an excessive length of feed—the same releasing action takes place, eliminating shock and strain on the machine as well as undue wear on the feed finger.

GEORGE SCHERR CO., 200 Lafayette St., New York 12, N. Y., presents a new tool grinding fixture for the precision grinding of lathe tools, shaper, planer, milling machine or any angle cutting tools.

The All-Purpose work on a new principle involving the use of compound angles. It is placed on the magnetic chuck of a surface grinder and is firmly held in place by the magnetic power of the chuck. It is graduated by degrees up to 90, and angles both left and right may be readily obtained. In addition, and at the same time, the rake angle is ground on the tool by means of a tipping block, which gives three, five, seven and ten deg. clearance. The principle involved employs four sur-

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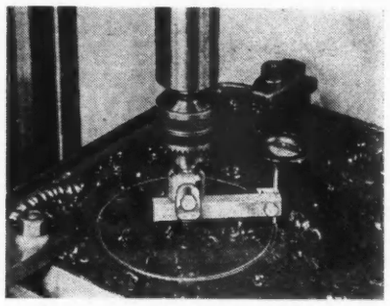
faces underneath the main casting, which are lapped to match the four surfaces of the tilting block so that when the three degree angle is desired the block is tipped to read three deg. and the block automatically lines up with the three deg. angle surface on the main casting. In like manner, the five deg., seven deg. and ten deg. clearance angles are obtainable.

The tool may be used to grind tools from ⅛ in. to 1¼ in. and is used for carbon, alloy and tungsten carbide tool bits. Both inside and outside threading and recess tools may be ground on the All-Purpose, and form tools also may be ground.

BRUNO TOOLS, Beverly Hills, Cal., has placed on the market a new all-purpose adjustable hole-cutting tool. This tool, the Bruno adjustable circle cutter, cuts holes to any diameter from 1⅞ in. to 8 in. through ¼ in. thickness in steel or other tough metals and any thickness up to 1½ in. in plastics, fibre or wood. (Thickness capacities may be doubled if cut is taken from both sides of material). The tools are designed to operate in any standard drill press, wood-working machine, or suitably mounted spindle machine.

The Bruno adjustable circle cutter consists of a combination drill and pilot with a new improved high-speed cutting blade, adjustable to depth and diameter. The exclusive Wedge-lok cutting blade holder permits the cutting edge to recede or yield from work while still maintaining steady pressure and feed. Cutting blade is resharpened without special tools by grinding on one edge only.

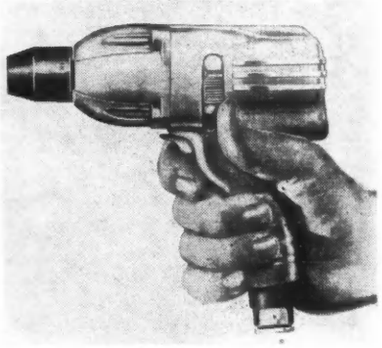


Bruno adjustable circle cutter

The twin-blade holder (fixed ½ in. center) cuts washers, wheels, discs and gaskets in one operation.

INDEPENDENT PNEUMATIC TOOL CO., 600 W. Jackson Blvd., Chicago 6, Ill., is offering a new Thor impact wrench for driving and removing nuts, bolts, and cap screws up to ⅜ in. thread size.

Rotatively striking impact jaws, set at a wide radius from the spindle center to reduce stress, and a short, rigid spindle shank that delivers the blow close to the work, are the principles in the new Thor impact mechanism. Elimination of fastenings in the mechanism and compact, streamlined design of housings reduce weight to 3¾ lb. and length of the tool to 5⅞ in.

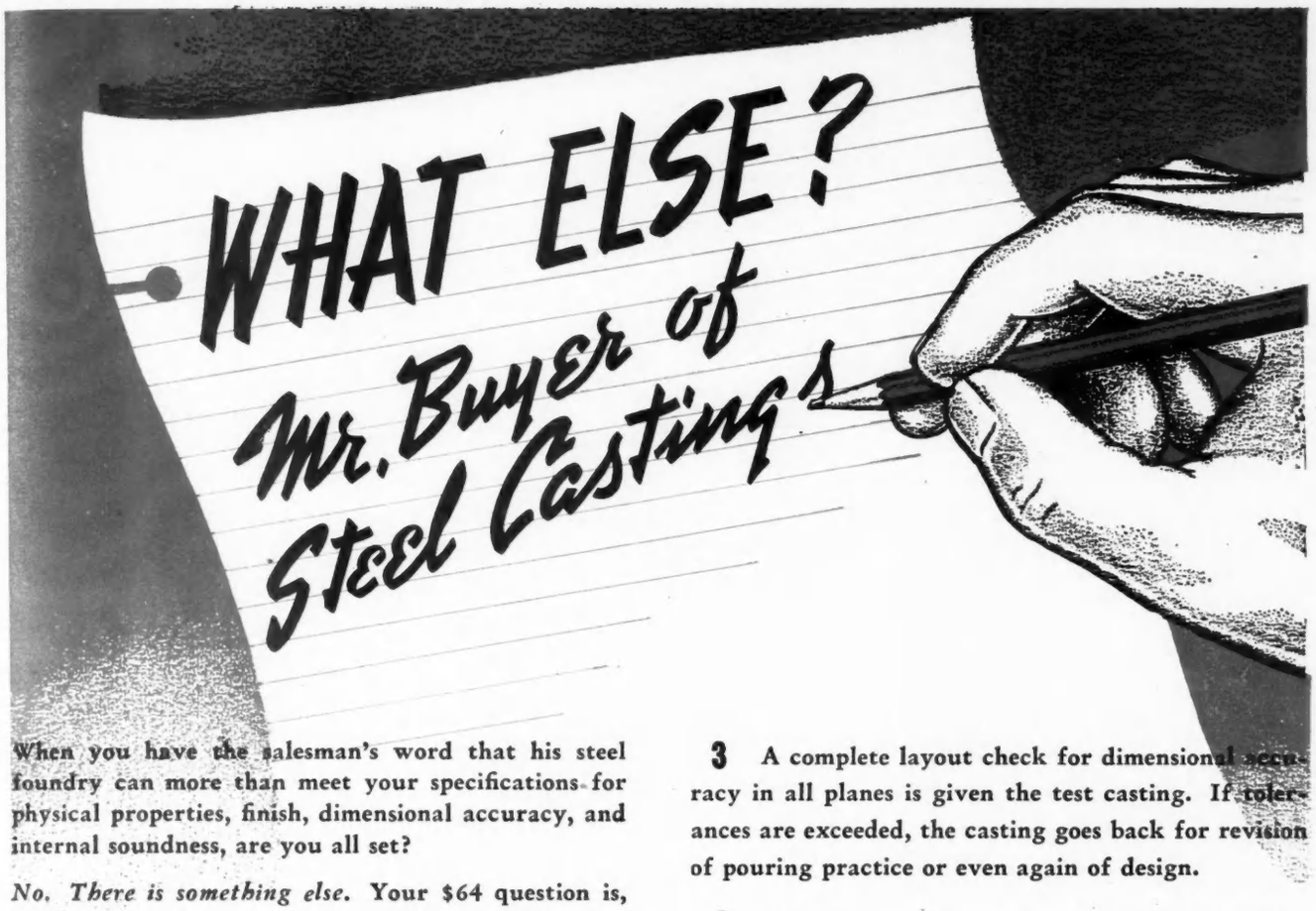


Thor impact wrench

A COMPLETE line of attachments which extend the application range of the Hager carbide tool grinder to the grinding of milling cutters, counterbores, inserted tooth face mills, spiral reamers, end mills and many other special type carbide tipped tools has been designed by E. F. Hager & Son, Queens Village, N. Y.

The attachments are said to assure constant, fixed control of the tools throughout the grinding operation, and enable the operator to work out in-

(*Turn to page* 88, *please*)



When you have the salesman's word that his steel foundry can more than meet your specifications for physical properties, finish, dimensional accuracy, and internal soundness, are you all set?

No. There is something else. Your $64 question is, "What precautions or procedures does your foundry take to insure that every casting will ring the bell?"

Racine Steel Castings Co. long before the war was at the forefront in setting up foundry procedures for insuring as far as possible that every customer would get his castings as specified and required.

1 Before your pattern is prepared for production, it is examined by our engineers to determine if it will produce the casting you want most economically for you.

2 A test casting is poured and X-rayed under high power to check internal soundness. If weaknesses appear, foundry practice is changed to try to overcome them. If this can't do it, design changes are worked out with you.

3 A complete layout check for dimensional accuracy in all planes is given the test casting. If tolerances are exceeded, the casting goes back for revision of pouring practice or even again of design.

4 Your pattern is put into production only after test castings rate perfect. All the way through production, close control is maintained by laboratory and foundry technicians.

5 Before the shipping department gets your castings, they have run the gauntlet of an independent Inspection Department that gives them a thorough going over for surface and internal defects, straightness, and adherence to dimensions. No cripples pass.

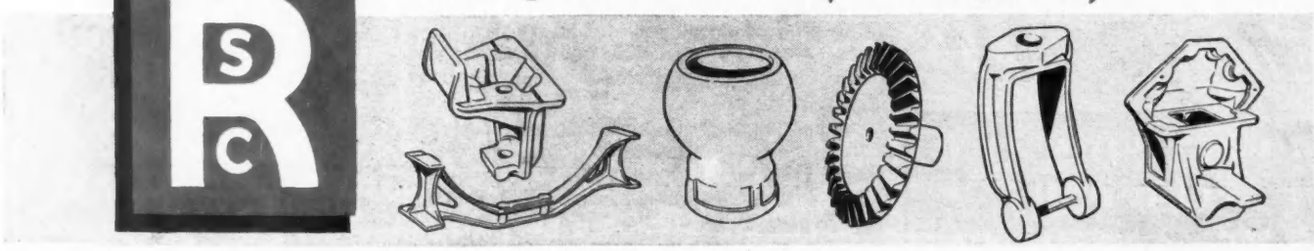
In short, it is one thing to set up specifications; it is another thing to know what your chances are of having every casting meet them. Buy your steel castings where that chance is closest to 100%.

RACINE STEEL CASTINGS CO.

DIVISION OF BELLE CITY MALLEABLE IRON CO.

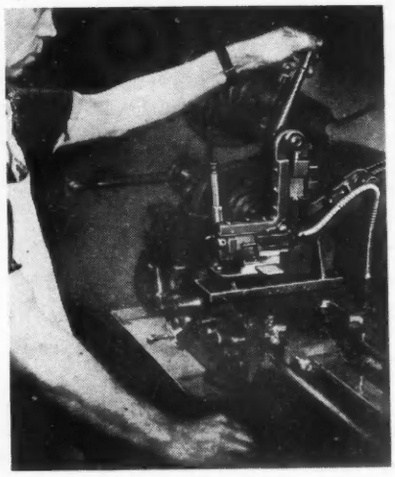
RACINE, WISCONSIN

Racine Carbon and Alloy Steel Castings



numerable arrangements to suit his individual requirements. All free-hand grinding is eliminated.

OXFORD ENGINEERING, INC., of Oxford, Mich., offers a new Swiss Type converter, designed to make any lathe or similar tool into a quantity production machine for multi-diameter parts. Tooling is by means of simple cams, which the user can make in his own plant. When not in use, the converter can be removed and stored, so that the lathe can be used for other work.



Oxford Swiss Type converter

The Oxford Swiss Type converter is said to produce any part from a needle point to ½ in. OD and from ¼ in. length to six ft. The manufacturer states that ground stock is unnecessary, production being fast and accurate with any kind of cold-finished stock, including stainless steel, ordinary cold-rolled, brass, aluminum, etc.

NSPA Roster Reflects Membership Increase

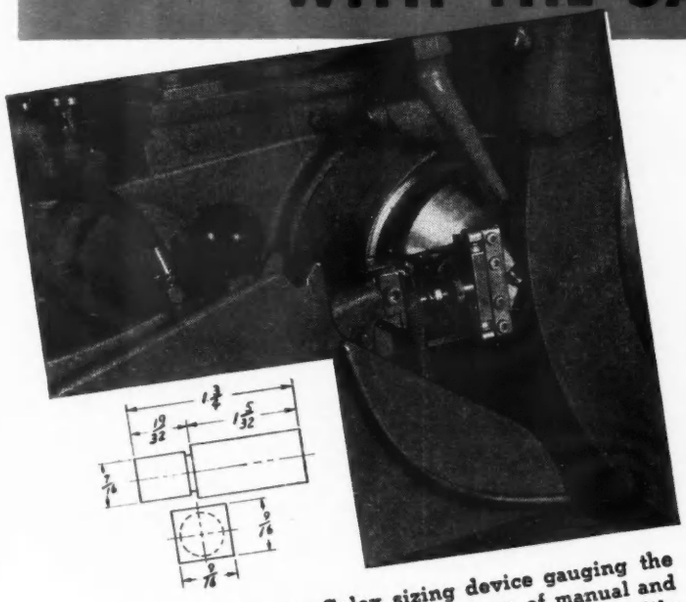
The most recent publication of the National Standard Parts Association, a book of 128 pages, has just been mailed to all members. It is the organization's new 1946 roster, described by NSPA officials as a volume which "impressively reflects the substantial gains of recent years in membership size, strength, caliber and industry representation, both at home and abroad."

With a 12 per cent increase in number of pages, the current roster contains more than 100 firm names not listed in the 1945 edition. World-wide representation has been increased by the addition of 19 distributors in Latin America. Attention is called to the fact that the wholesaler-manufacturer association now has members in Canada, Mexico and 15 countries in other parts of the world.

The roster contains the names of all new members, including those whose applications were approved by the board of directors in January of this year.

Automatic Sizing

DOUBLED GRINDER PRODUCTION WITH THE SAME MANPOWER



Closeup of Landis-Solex sizing device gauging the part shown in the sketch. Comparison of manual and automatic operations shows how a man can readily handle two machines.

MANUAL

1. Chucks Work
2. Moves Sizing Device In Place
3. Starts Work Rotation And Rapid Infeed
4. Unchucks Work

AUTOMATIC OPERATION

1. Controls Feed
2. Brings To Size
3. Returns Wheelbase
4. Returns Rapid Infeed Lever
5. Stops Coolant Flow
6. Stops Work Rotation

The automatic sizing device was developed by LANDIS TOOL engineers for high production grinding jobs or long production runs. Its application to the machine illustrated is typical of how LANDIS TOOL engineers provide a specific solution to grinding problems.

An exclusive LANDIS TOOL development, the Landis-Solex sizing device controls all the necessary grinder movements. It is only necessary for the operator to load and unload. No attention is required during the grinding cycle. One operator can handle two machines and work to tolerances of .0003" on ordinary work. Since sizing is done from work diameter, accuracy is independent of wheel wear, amount of stock removed or wheel dressing.

For help in solving your grinding problems call on LANDIS TOOL for a custom engineered solution.

36

CENTERLESS GRINDERS TOO, BY LANDIS TOOL...OF OUTSTANDING NEW DESIGN. WRITE FOR CATALOG T44

LANDIS TOOL COMPANY
WAYNESBORO • PENNA.

LANDIS TOOL
Precision Grinders

Fuller's Reorganized Setup

(*Continued from page* 40)

Gage-matics, a new Bryant 16-Y-16 internal grinder, Fitchburg spline grinders. Cylindrical grinding in this department is done on Cincinnati Filmatic grinders of the latest type. Here, too, are some Cincinnati Centerless grinders, including one of the latest models. Norton grinders, however, are found in other departments as will be evident on the routings. Latest acquisition in the grinding department is a large Niagara alkali washing machine which handles the cleaning of all parts.

In Department 15 is found the machining of miscellaneous parts such as bearing covers, brake levers, and the large variety of yokes. It contains a large variety of general purpose machinery including new Gisholt and Foster Fastermatic turret lathes. Yokes are broached in a large horizontal American broaching machine of two-ram type.

The assembly department features a floor conveyor line with a rail for guiding the assembly fixtures which are rolled from one station to another to the end of the line. Sub-assembly benches are arranged at the side of the line for making up the various units at the point of installation in the case. An interesting feature is the adoption of a Hannifin hydraulic press for pressing gears onto the shafts.

As the transmissions are completed they are transported to the final test stand for a 100 per cent test schedule in each speed for noise characteristics. Standard procedure is to fill the transmissions with a special break-in oil for the test and using the magnetic type Lisle drain plug. When the test has been completed, the drain plugs are removed, the break-in oil drained and flushed.

Rounding out the plant facilities are an excellent tool room and a separate department for handling and shipping service parts. Mention was made earlier of the experimental department which has facilities for making special parts, for the assembly and servicing of units under test, and for the testing of transmissions on the four-square machine as well as with an engine on a new dynamometer.

Suitable facilities also are provided for the metallurgical laboratory which contains chemical laboratory equipment, microscopes, and photographic equipment for taking micrographs.

It is of interest to find that most of the castings used in the plant are produced in the Fuller foundry on the premises. It is capable of melting about 19 tons of metal per day and is provided with mechanical molding machines for core and mold making.

The factory management gives special attention to the tooling of its equipment in the interest of economical metal removal. To this end, cemented-carbide tipped tools are employed for the machining of cast iron and steel wherever this is feasible. Since the plant contains both new and old machines, it is safe to generalize that cemented-carbide tools are found on most operations, certainly on all new machines.

Air Express Shows Large Increase

An almost ten-fold increase in seven years for air express ton miles flown is reported by the Air Express Division of the Railway Express Agency. Official 1945 figures show a total of 20,442,780 ton miles of air express flown as compared with 2,172,855 in 1938, the first year the Agency computed its air shipments in ton miles.

The average haul for an air shipment in 1945 was 1,109 miles, a figure that has remained fairly constant in the past several years. Air Express service was started in 1927.